SPRECKELS

SUGAR BEET

BULLETIN

Vol. 27 1963

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SPRECKELS SUGAR BEET BULLETIN

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SOME SUGGESTED CROPS FOR SUGAR BEET GROWERS

Crop rotation is a basic necessity if land is to continue producing sugar beets.

DISEASES AND PESTS

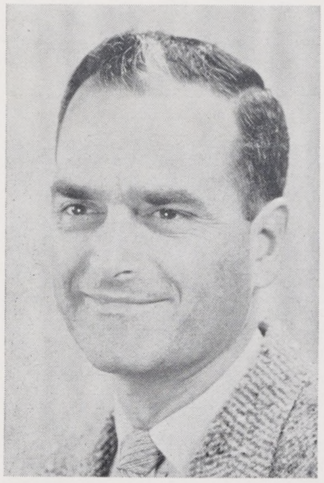
SOIL STRUCTURE

WEED CONTROL

are some of the factors in which rotation helps to maximize sugar beet profits and maintain land value. See page 10.

DON'T BEET YOUR LAND TO DEATH

By F. J. HILLS
Extension Agronomist
University of California, Davis



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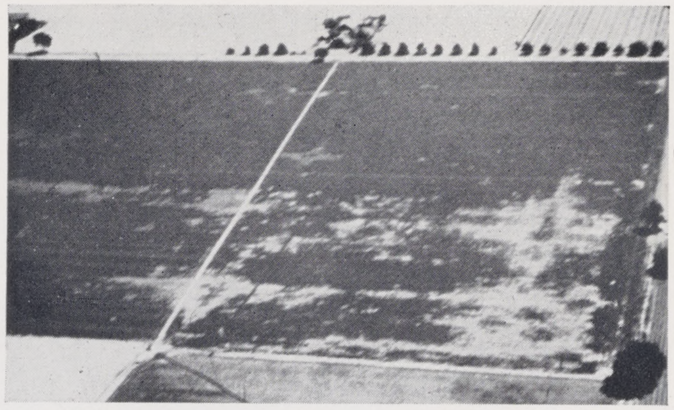
IT IS OFTEN tempting to produce two or more sugar beet crops in successive seasons on a given piece of land. This is especially true when beet yields are high, prices are good, and when leasing is on a short-term basis and there is pressure to make as much money as possible from a given field each season. Such a practice may maximize earnings for a few years, but leads to trouble in the future.

If you grow different crops in different years on the same piece of land, you are practicing some sort of crop rotation. The mere rotation of crops, however, may not be beneficial, and some rotations may be the principle reason for declining yields and reduced farm income. The farm manager who understands what crop rotation can do, and is aware of the principles upon which the practice is based, has an effective means for combating many production problems. In sugar beet production there are certain problems that crop rotation can deal with quite effectively. The following discussion emphasizes some of the problems and factors in beet production where rotation may be a distinct help.

DISEASE AND PEST CONTROL

Declining yields in a cropping system where sugar beets occur too frequently are often the result of an increase in plant pests. In some areas of the United States sugar beet production has been greatly curtailed and factories have even closed due to the ravages of the sugar beet nematode. In California, this pest has been known for many years in the older beet growing areas of the coast and the Sacramento Valley where it causes serious crop losses each year. The nematode greatly impairs the ability of plants to take up water and thus its effects are most severe in warm climates. Recently, the sugar beet nematode has appeared in areas of the state where the advent of sugar beet production has been more recent. This pest was unknown in the Imperial Valley prior to 1957 and in the San Joaquin Valley prior to 1961. At present there are more than 270 fields infested in the Imperial Valley and at least four infested fields in Tulare County.

What can crop rotation accomplish with regard to the sugar beet nematode? First of all, proper rotations, coupled with good sanitation practices, can prevent new infestations and prevent a serious build-



F. J. Hills Photo 29

NEMATODE (Heterodera Schachtii) was responsible for the bare patches in this sugar beet field (air photo taken near Davis).

up of the nematode from low-level infestations. Rotations are effective when the population of a pest or disease declines rapidly in the absence of host plants it prefers. Fortunately, this is the case with the sugar beet nematode. Experience has shown that sugar beets can be successfully grown on moderately infested fields if beets and other susceptible crops are planted only once every four years and weed hosts are eliminated. Susceptible crops that should be avoided in a rotation are: table beet, swiss chard, spinach, and all crucifers such as broccoli, cabbage, brussel sprouts, cauliflower and radish. Weed hosts that will maintain populations of the nematodes and which should be controlled throughout rotation are: mustard, pig weed, purslane, lambsquarter, shepherds purse, wild radish and curly dock. In heavily infested fields it may be necessary to eliminate all host plants for five or six years before sugar beets are grown again. In fields that appear free of the pest it is good insurance to allow three years between susceptible crops and thus prevent chance infestations from increasing to damaging proportions.

Sclerotium rot is another serious sugar beet disease for which rotation is an effective and, at present, the only practical means of control. In the 1930's this disease became widespread in the Sacramento Valley and Delta areas. Dr. L. D. Leach of the Department of Plant Pathology of the University of California at Davis demonstrated that successful control could be obtained by rotation and developed a system of soil sampling that can be used to assay the level of fungus infestation in the soil. After 3 or 4 years in crops that are less susceptible

COVER NOTE—These are just a few of the crops which growers may elect to raise during the three or four years between sugar beet crops on the same land.

Other rotation crops include alfalfa, field corn, milo, oats, onions, rice, safflower, wheat and all sorts of vegetable and seed crops.

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For nematode control avoid the mustard family (broccoli, cabbage, cauliflower, kale, radishes, turnips, etc.)

Prof. J. B. Kendrick Photo 31

SCLEROTIUM Rolfsii does this to sugar beets. Rotation can do much to eliminate this serious fungus disease.

the soil can be sampled to determine if sugar beets can again be successfully grown.

In planning the crop sequence, stop and consider your pest and disease problems. Use crops that will reduce instead of multiply your problem.

SOIL STRUCTURE

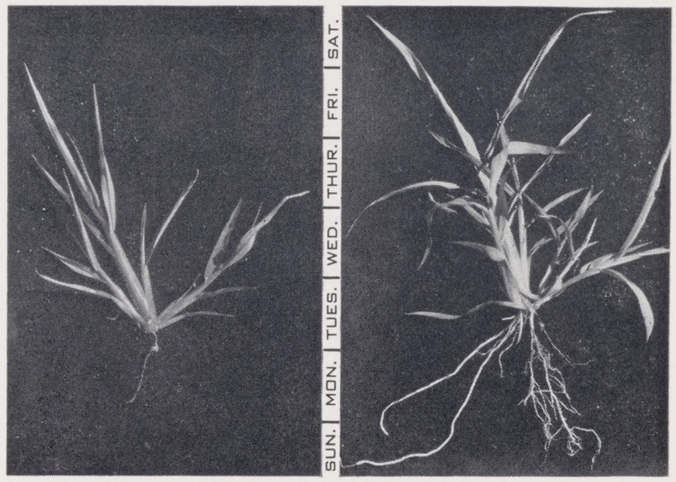
Repeated equipment travel and cultivation of soil, particularly when it is wet, results in soil compaction and thus poor water penetration and reduced crop growth. Crop rotation plays an important role in keeping soils in good tilth. The use of crops that do not require excessive equipment travel; crops that will allow soil to be worked in the fall when it is dry; and the incorporation of low nitrogen crop residues such as grain straw, grain sorghum and field corn residue will help greatly to improve water penetration. Research by Dr. W. A. Williams of the Agronomy Department, University of California, Davis has demonstrated that the incorporation of grain stubble and field corn residue

Continued on Page 16

GET THAT WATERGRASS EARLY

WATERGRASS is, without a doubt, the most serious economic weed in California sugar beet fields. Yet the watergrass plant is so easily destroyed when it is young.

The two photos below were taken of grass plants which differ in their stages of development by only one week. There is a period in the development of the grass during which a sizeable grass plant structure grows from the single hair-like radicle sent down by the original germinating seed. It is almost miraculous that such a large structure of grass can subsist on the thin hair-like root; but such is the case, and only a few days are required for a substantial mass of roots to be sent down by the crown and permanently anchor the plant. The obvious thing to do is to get this vicious weed while literally hanging by a thread. In this condition a tine weeder run along the row or a rotary device, like the Speedy can remove a tremendous amount of watergrass with only a nominal reduction of the sugar beet stand.



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HANGING by a hair — a sturdy water grass plant, but supported only by the original single hair-root.

ONE WEEK LATER—A mass of tough roots now anchors the plant solidly—no tine weeder would possibly dislodge it.

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AT HARVEST time, the beets in the truck are hidden by watergrass clumps—what beets there are have been dwarfed by watergrass competition.

INDICATOR STRIP METHOD FOR DETERMINING FERTILIZER NEEDS

By Dr. VARON JENSON
Plant Physiologist
Spreckels Sugar Company

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BEET GROWERS who have experienced difficulty in producing crops of high tonnage with high sugar concentration may well suspect that their soil nitrogen management program needs reviewing. It is likely that soils which have been producing high tonnages of beets containing a low percentage of sugar have been supplying excessive amounts of available nitrogen to the beet plants. The result of such a condition is that the beets continue to produce leaves and other vegetative tissue rather than storing sucrose in the root tissue. In this manner root tonnage may continue to increase until harvest time, but sucrose concentration remains low so long as nitrogen is readily supplied to the beet plant by the soil.

A complicating factor in the solution of nitrogen fertility problems is that field soils, as well as cropping and fertilizer histories, are extremely variable in California. As an optimum solution, a detailed, replicated fertilizer trial in each California beet field would yield very useful information. But such a program is physically and economically impractical, so other solutions have been advanced. The use of nitrogen fertility indicator strips offer attracitve possibilities in this regard.

ESTABLISHING THE NITROGEN FERTILITY STRIP

Very simply stated, this method employs the establishment, within a beet field, of sets of 4 or 8 bed strips to which more and less nitrogen has been applied than is used in the field generally.

The purpose of establishing fertility indicator strips is to observe the response of the beet crop to variable amounts of applied nitrogen under the conditions of the grower's own soil and crop management practices. Therefore, it is essential that the strips be established in an area of the field which is free of unusual soil conditions or soil treatment. An area which represents the average soil conditions of the field should be selected. The strips should also be readily accessible for frequent observation and occasional sampling.

Another important element of this program is that conservative amounts of nitrogen should be used as preplant and initial sidedress applications.

1/3 Normal Nitrogen—Preplant Only—Skip Sidedressing

Normal Nitrogen—Usual Program—as rest of field

1-1/3 Normal Nitrogen—Excessive—Double Sidedressing

USUAL PROGRAM (TYPICAL EXAMPLE)

60 LBS. N, Preplanted

120 LBS. N, Sidedressed

180 LBS. N, Total for Season

FIGURE 1—Beet field layout for N-Fertility Indicator Strips.

Opportunity should be available for increasing the nitrogen fertility in a field during the season if a deficiency is demonstrated.

Figure 1 has been prepared to illustrate possible layouts for fertility indicator strips in a beet field. Rates employed are only suggestions, because practices are so variable within the state. However, the half-application method mentioned above has been used with success and a skip-and-lap method has also been useful. With the latter method, indicator strips are established by skipping a four bed strip of beets during the application of side-dressed nitrogen and then making a duplicate pass over an adjacent four bed strip.

With this techniquè, the field contains 1) a strip of beets with only a preplant application of nitrogen, 2) a strip with the preplanted nitrogen plus double the amount used as a sidedressing, and 3) adjacent beds of the field which received the sidedress and the preplant.

INTERPRETING THE RESULTS

Once a set of indicator strips is established within a beet field, the area should be marked and observed at frequent intervals. Particular attention should be given to an indication of nitrogen deficiency by plants within any one strip. During the latter portion of a growing season, root samples from all strips may be tested for yield and sugar content in order to determine if differences exist. (Your field superintendent will help with this.) It is likewise essential that a *lack* of difference in plant

performance across the several strips be noted and evaluated.

If the strip of beets receiving the lowest rate of nitrogen application begins to show signs of nitrogen deficiency early in the season, this may be the signal that the field generally will soon be deficient and, therefore, additional nitrogen should be applied in order to obtain maximum production.

If, however, no visible differences in top growth, color or yield are evident in the indicator strips as compared to the rest of the field, then there is evidence that even the lowest rate of application was excessive. This is true especially when no difference in sugar content is noted in beets receiving the various applications of nitrogen.

SOME GROWER EXPERIENCES

Growers who have used this technique have often reduced their usual rate of nitrogen application by a small amount and then provided a strip which received only half the amount of nitrogen applied to the remainder of the field. For example, a San Joaquin County grower who traditionally applied 160 pounds of nitrogen per acre to his beet crop agreed to reduce the rate to 120 pounds per acre and then established a four-bed strip which received only 60 pounds of nitrogen per acre. The results of this grower's experience, as well as that of other growers, are presented in Table 1.

Table 1. Examples of Grower Experience with the Nitrogen Fertility Strip Method

Field Location and Crop Year	Nitrogen Additions, Pounds N Per Acre	Sugar Beet Production Data: Tons Roots Per Acre	Sugar Content %	Sugar Produced Tons Per Acre
1. San Joaquin County* 1959	120	35.8	13.5	4.83
	60	35.8	14.7	5.26
2. San Joaquin County* 1959	140	32.2	14.8	4.77
	70	32.2	15.4	4.96
3. Monterey County 1960	50	44.5	16.1	7.16
	0	42.2	17.1	7.22
4. Monterey County 1961	80	31.3	13.2	4.13
	40	31.5	14.1	4.44
5. San Joaquin County** 1962	240	25.8	15.7	4.05
	160	28.2	16.6	4.68

*Data of S. S. Anderson **Data of V. M. Horton

Some important points are illustrated by the data of Table 1.

First, there is no indication in these field results that the lower rate of nitrogen fertilization produced a lower tonnage of roots. The nitrogen content of the soil carried over from previous crops, along with the lower rate of nitrogen application, produced as high a tonnage of roots as did the high applied rate. Second, in every case cited, beets with less nitrogen developed the higher concentration of sugar in root tissue. Third, sugar per acre was higher in all cases when the crops were grown with the lower rate of nitrogen application.

An estimate of the monetary value of the measured changes in crop response can be made by realizing that beets are worth approximately $1.00 more per ton for each percentage point increase in sugar content. The cost of the un-needed nitrogen applied varies from approximately 5 to 13 cents a pound.

It is relatively simple to see from these data that in the cases cited, the higher rates of nitrogen used resulted in producing a crop worth less money in addition to the increased cost of the additional, unnecessary, higher rate of nitrogen application.

A simple calculation with these figures can illustrate some pronounced difference in crop value, frequently in favor of the lower rate of nitrogen fertilization. These data in Table 1 may not be characteristic of all beet lands in California, but they illustrate a problem of increasing scope.

SUMMARY

The beet grower who has traditionally produced high root tonnage but has been plagued with low sugar content should explore the possibility that excessive soil nitrogen content is contributing to the problem. A suggested method of determining this possibility on the grower's own ranch includes a conservative preplant and initial sidedress of nitrogen and the establishment of fertility indicator strips within the field. These strips can be useful in verifying the presence of excessive soil nitrogen in the field or as an indicator of the crop need for additional nitrogen during the season. The grower will find the services of sugar company field superintendents readily available and helpful in the exploitation of these possibilities.

MACHINE THINNING DEMONSTRATION

NEAR TULARE, on March 12th, a demonstration of the leading makes of sugar beet thinning machines was staged on the Petri ranch.

Arrangements for this meeting were made by William Hodson, Spreckels Field Superintendent residing at Visalia. A gratifying number of growers from the central and southern San Joaquin Valley turned out to see the machines at work and to hear explanation by members of the Spreckels staff on the theory and practice of mechanical thinning.

Representatives of the machine manufacturers explained the operation of their devices, and added to the occasion by supplying coffee and doughnuts.

Rowland Hornbostel Photo 35

A THINNING DEMONSTRATION near Tulare attracted growers from the Central and South San Jaoquin Valley on March 12. William Hodson, Spreckels Field Superintendent, arranged the event.

SPRECKELS AGRICULTURAL STAFF HOLDS ANNUAL MEETING

A THREE DAY MEETING of the Spreckels agricultural staff at Palo Alto, February 19-22, brought together field superintendents, agricultural superintendents, district managers, special services staff and the agricultural executive staff.

These meetings are held each year in order that all members of the Agricultural Department may become familiar with each others problems and with the very important relationship between the Agricultural Department, the Operating Department and Sales Department.

One session of this meeting was devoted to talks by specialists in fields relating to sugar beet agriculture, and some time was spent in the presentation of papers by various members of the Operating, Sales and Financial Departments.

The remaining time was devoted to practical and theoretical discussions by Agricultural Department members.

Photographer Unknown 36

THE SPRECKELS Agricultural Staff, in 1939—half as many men as in 1963 but they took care of considerably less than half of the 1963 contracted acreage; and there were none of the special services provided by today's plant breeders, plant physiologist, agricultural engineers and agronomists.

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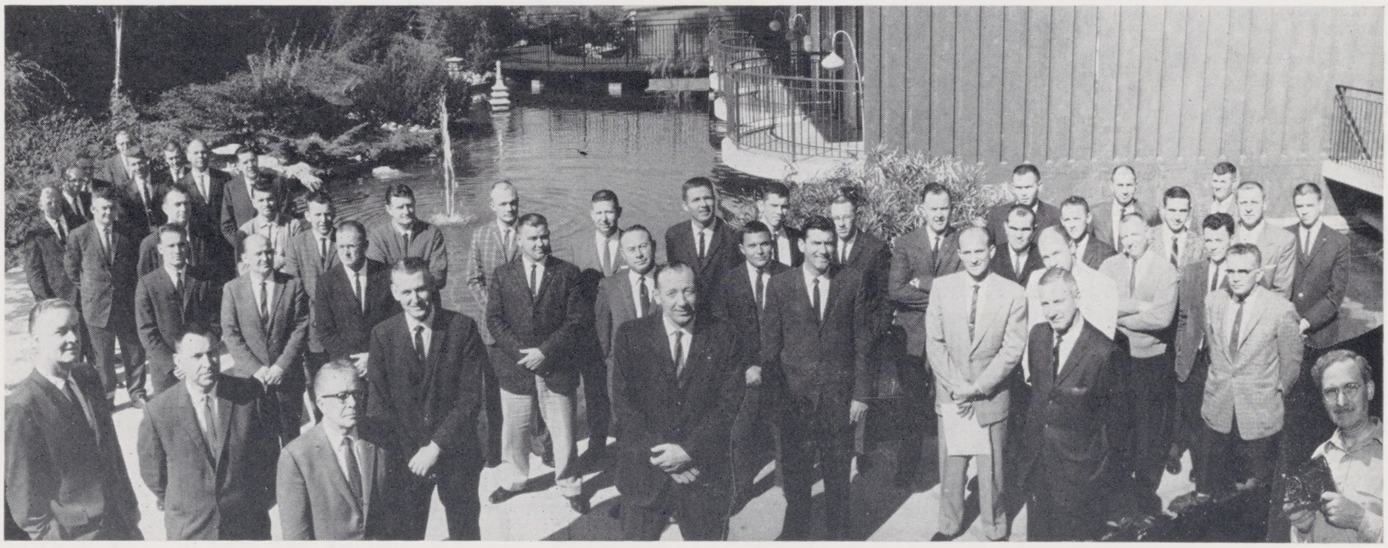
Above

DR. MERLINO CREMATA GORDON LYONS

Below

JOHN HOPKIN NEWT HARDMAN

THESE EXPERTS from organizations and industries close to the beet sugar business spoke on their specialty subjects.



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THE SPRECKELS Agricultural Staff met in Palo Alto, February 19-23. Concentrated "Short Courses" were conducted by members of the Spreckels Agricultural, Operation, Financial and Sales Departments.

Notes from Our Field Men

GIB MAURER, WOODLAND

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Due to the recent announcement of a $23.50 tomato price many of our sugar beet growers are making requests for substantial sugar beet acreage. With the prevailing barley price these past few years, coupled with a poor outlook for the 1963 barley crop due to dwarf yellows, the future of barley income does not appear to be very favorable.

Beet growers should give careful consideration to their sugar beet rotation before they make requests for additional acreage. During the past few years we have seen our beet rotation period become shorter. It may be well for our beet growers to focus their attention on what has happened to some of the beet growing areas of the state where poor sugar beet rotation has led to disastrous results.

ROBERT ALDERSON—BAKERSFIELD

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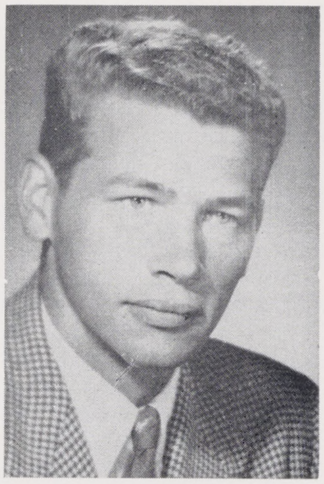
It has been reported by Mr. Seldon Morley, Agricultural Commisioner of Kern County, that Kern County received a clean bill of health as far as Sugarbeet Nematode is concerned for the 1962 season. The dirt sampling program was completed September 20, 1962 with negative results in all of the over 1200 samples tested in Kern County. Mr. Morley was concerned however, in that a similar program of taking dirt samples daily from each field was not being conducted in Tulare County where some cases of sugarbeet nematode were found last year. Mr. Morley feels this program is necessary to determine if the fields found to be contaminated with sugarbeet nematode during 1961 have been corralled, or if the nematodes have become spread throughout Tulare County.

In that Kern County is still considered to be sugarbeet nematode free, it is important that all possible precautions be taken to prevent its spread into Kern County beet fields.

J. N. DAWE, GILROY-HOLLISTER



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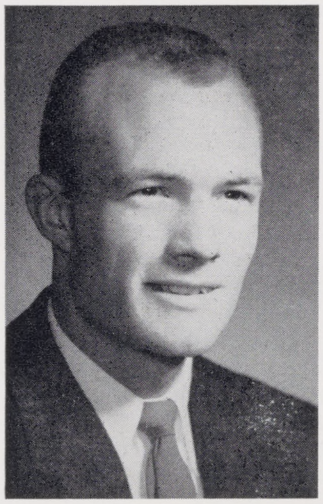
Heterodera Schachtii, or sugar beet nematode, has started taking its annual toll in my district. First identification of the pest was made about three weeks ago on some beets on Bloomfield Road near Gilroy. Since that time we have determined the presence of the nematode in numerous other fields. The degree of infestation varies from light to disastrous. Two fields have been abandoned, one before thinning, and one after the thinning was completed. Most of the remaining infested fields consist of localized areas within fields which will result in a yield reduction rather than an abandonment.

GENE WILKINSON—WOODLAND



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It is surprising to hear the numerous reasons some growers have for planting their beets flat, using 6 to 7 pounds of seed per acre. "Seed is cheap", they say, so an extra couple of pounds per acre is not costly and they sleep better. One person told me it didn't take any longer to thin a heavy stand than a light one. His point was that he still had to thin, regardless. The other day he told me it was costing $40.00 per acre to thin the beets.

I wasn't surprised, as he is paying by the hour and the men are very slow. Even then they are leaving many doubles and multiples. I think a grower could thin mechanically, with no hand labor to touch it up, and do at least as good a job.

The weather last month had been warm and breezy. This had removed the surface moisture and some of the early planted fields were being stressed for moisture. Others who had planted recently lacked adequate moisture for germination, as it dried down below the seed. The rain finally arrived and barely saved the stands.

It seems strange to me some people are so willing to plant the extra seed as "cheap insurance," for "better sleep"; and yet gamble everything on the weather and flat planting.

DON'T BEET YOUR LAND TO DEATH

Continued from Page 10

can more than double the rate of water infiltration for at least several months after incorporation.

SOIL FERTILITY

Fertilizer not used by shallow rooted, heavily fertilized crops can be used to good advantage by deeper rooted sugar beets. The sugar beet crop itself can provide mineral nutrients for succeeding crops. On a dry weight basis, sugar beet tops usually contain 2% or more nitrogen. When material this high in nitrogen is incorportaed into soil it decomposes rapidly and the nitrogen is available for subsequent crop growth. Twenty tons of sugar beet tops (a reasonable production per acre from a twenty to twenty-five ton root crop) contain about 6,000 pounds of dry matter. At 2% nitrogen this is 120 pounds of nitrogen per acre; enough nitrogen to fertilize a subsequent grain crop or to provide a large portion of the nitrogen requirement for more heavily fertilized crops.

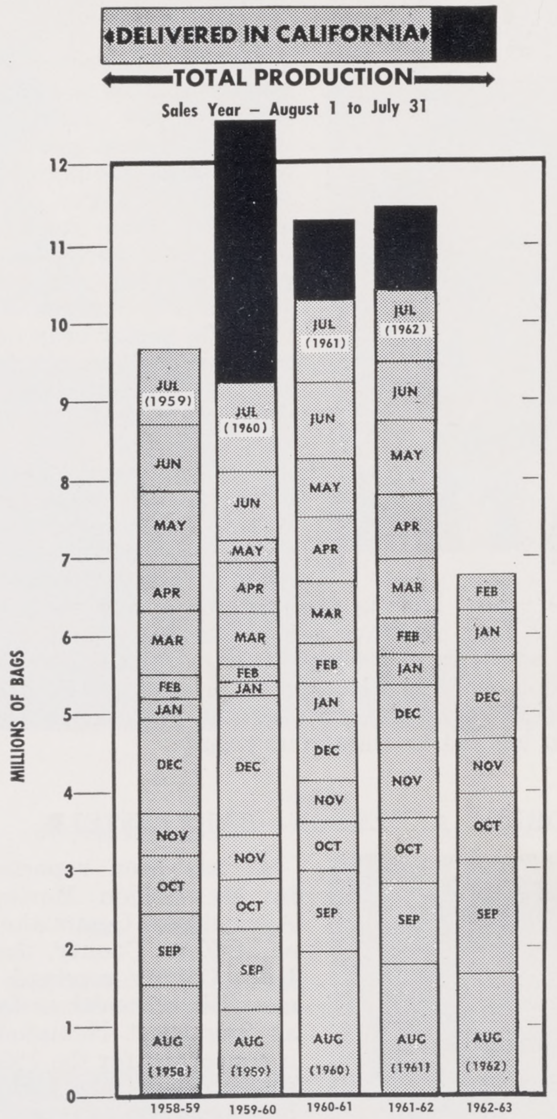
WEED CONTROL

In any crop there is usually a particular group of weeds that are most common. In sugar beets for example, lambsquarter, pigweed, and watergrass tend to build up. Growing sugar beets, or similar crops, year after year, allows these weeds to become a major production problem. Even with the many chemical weed killers available it is not possible to spray selectively to control all weeds at all times. Watergrass is a prime example. Chemicals are available (but expensive) that will control the watergrass that emerges when sugar beet seedlings do. However, even in cases of moderate watergrass infestation, there will be late germinating grass that will not be controlled by chemicals applied at planting. Repeated culture of beets, tomatoes, or cotton, all crops that are harvested late in the fall, will allow a buildup of this grass and lead to serious problems. Rotation with crops like alfalfa, beans, potatoes or grain can help reduce infestations by making it possible to control weeds that germinate during the summer.

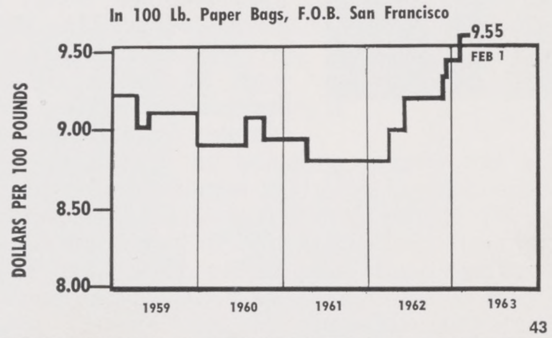
Crop rotation has other advantages too; The possibility of improved timing of operations because of a smaller acreage of a given crop; more efficient use of irrigation water; and the stabilization of farm income by diversification of risks.

All things considered, crop rotation does pay! In the case of sugar beet production it is essential for the survival of a healthy industry.

PRODUCTION AND DELIVERIES OF BEET SUGAR IN CALIFORNIA



QUOTED PRICE OF BEET GRANULATED SUGAR



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All photographs by the editor unless otherwise indicated.

AUSTIN ARMER, EDITOR   SPRECKELS SUGAR COMPANY   WOODLAND, CALIFORNIA

SPC-DAVIS

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SPRECKELS SUGAR BEET BULLETIN

VOL. 27 MAY-JUNE, 1963 NO. 3

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THE QUEST FOR CLEAN BEETS

This important goal is accomplished, in part, by well supervised

DIGGING

TOPPING

LOADING

THE QUEST FOR CLEAN BEETS

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Company

EDITOR'S NOTE:—This is the first of a series of articles dealing with the many factors contributing to the delivery of sugar beets ready for processing *to the sugar factory.*

This is part 1—the development of digging methods contrived to deliver "all the beets and none of the field"—an ideal situation yet to be fully accomplished.

"THE GROWER AGREES to deliver beets free from stones, trash or foreign substances liable to interfere with the work in the factory."

So reads the grower contract used by Spreckels Sugar Company in 1912, and with minor changes in wording, up to the present time.

Spreckels growers have always attempted to abide by the "clean beet" clause. Some tried harder than others, and in 1963 many of the cleanest loads are practically "free from all foreign substances."

When a field of sugar beets is ready to harvest, there may be some obstacles to harvesting clean beets which cannot be overcome by the harvesting operation, no matter how well conducted. Extreme conditions involving weeds, rocks or hard soil are important contributors to dirty beets in the truck and such cultural factors, outside the scope of this chapter, will be discussed in a later article.

DIGGING "JUST THE BEETS"

The presence of soil with the beets as they are dug has long been a source of concern to inventors of beet harvesting machinery. The earlier attempts at mechanical beet harvesting were mainly attempts to adapt potato harvesters to the beet field.

Horse-drawn potato diggers appeared in great variety during the second half of the 19th century. Most of these devices contemplated some means of *sifting* loose soil from the potatoes ("Potato chain" is a heritage of this era). Such a procedure worked with potatoes, which are rarely grown in heavy cloddy soil, and which have no hair roots by which soil adheres.

A potato digger patented in 1872 in the United States by a Canadian inventor held the germ of a successful beet digger, but the patent evidently escaped notice until a search was made in 1949 to determine the patentability of a digger invented by Carl Oppel, then residing in Alberta, Canada.

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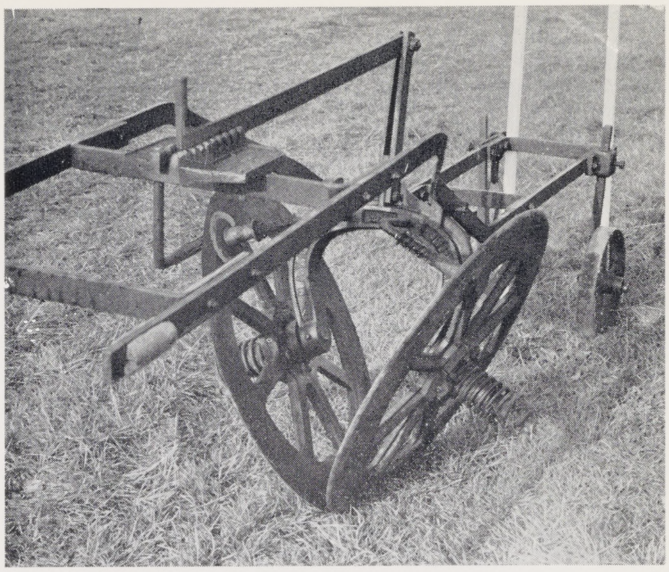
COVER NOTE—In 1956 this experimental Oppel harvester delivered well-topped beets, free of dirt and trash, on the Frick Ranch near Arvin. Then, as now, clean beets were the result of clean fields and a closely supervised harvest operation.

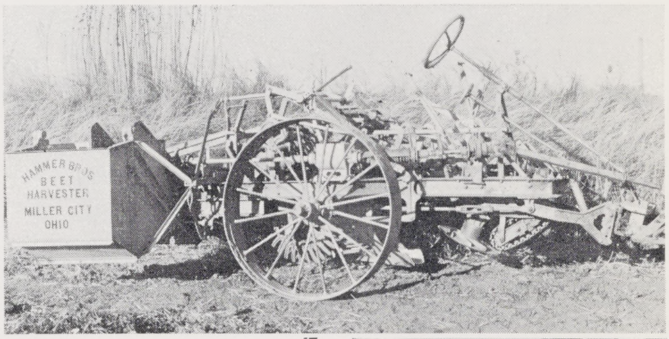


46

1923—ROBERT MAYNARD (1845-1930), of Whittlesford, England, built and sold numbers of these horse-drawn beet lifters. Note the features claimed in 1963 models of U.S. built harvesters—adjustable wheel angle and mud scrapers, to say nothing of the spring-loaded wheels (Photo copyright by British Sugar Corporation, Ltd.).

Meanwhile, the same principle had been invented and reduced to practice by Mr. Robert Maynard, an implement maker at Whittlesford, near Cambridge, England in 1923 or 1924, and sold in considerable numbers for digging sugar beets, particularly in England's fen (peaty) soils.

There is no evidence that recent U. S. inventors of beet harvesters were aware of either 'Maynard Wheels" or the 1872 potato digger wheels. Necessity is the mother of invention, and the necessity to free sugar beets from soil existed in full measure as an obstacle to developing a successful sugar beet harvester.



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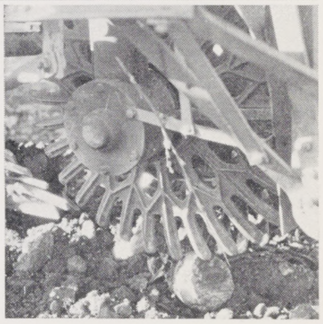


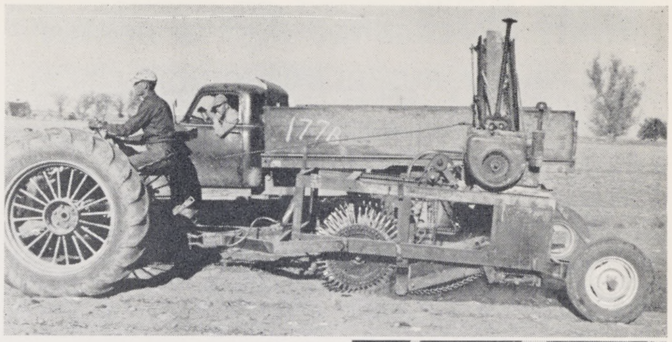
48

1932—HAMMER BROTHERS of Ohio perfected this sophisticated beet harvester, including disk-topper with driven caterpillar finder and finger-rim beet pickup wheels, shown in detail at right. (Photographed at Longmont, Colorado, October, 1932 by E. M. Mervine).

The "Colorado Lifter," or double blade plow was an effective beet digger in friable soils. Most of the earlier sugar beet harvesting machines employed double-blade plows. (The origin of the double blade is obscure—it probably came to this country from Germany as the horse drawn "Bow plow.")

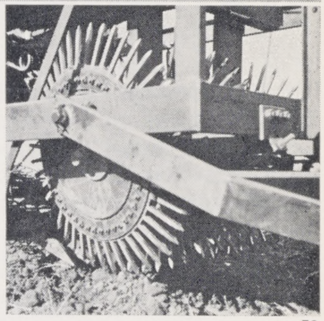
Beet harvesters built commercially in the United States at this time favor the wheel type lifter. This preference is probably based on the lower draft of the wheel lifter as compared to the double point lifter. But the wheel lifter comes to grief in heavy, dry soils. Its sharp rims slice through the crust, lifting out a ribbon of soil which contains the beets. This ribbon then cracks apart at each beet, forming large solid chunks, almost impossible to break up or separate in any subsequent screening operation.

As a primary step in the quest for clean beets, it would be well if our harvester inventors would seek new principles of digging. The Vicon digger in Holland, while suitable only to light soils, is an example of a new departure in digging principles. So also is the oscillating plow principle applied to the "Artesian" subsoiler.



49

1949—CARL OPPEL, of Alberta, Canada, demonstrated this lifter-loader at Fort Collins, Colorado. Finger-rim pickup wheels were effective, but unpatentable because they had been patented in 1872 for use in a potato digger. (Photographed by Prof. R. D. Barmington).



50

MODERATE NITROGEN, AMPLE WATER MAXIMIZE YOLO COUNTY SUGAR YIELD

By JACK BRICKEY
Agronomist, Spreckels Sugar Company

FERTILIZING AND IRRIGATING are two practices which are under direct control of the grower, and yet which have a vital influence on the outcome of his crop.

We have stressed the proper use of irrigation water for twenty-five years in the Sugar Beet Bulletin, as well as the important interrelation between water and fertilizer. Effective control of these two factors will give the grower maximum yield under his particular field conditions.

To further substantiate information which we gained in 1961 from plot studies conducted in the San Joaquin Valley, an irrigation-nitrogen experiment was conducted near Woodland on May-planted beets in a commercial field. The soil was a heavy clay type. The field was fallowed in 1961 and had barley crops in both 1959 and 1960, each having 35 units of nitrogen applied. The entire field was supplied with 60 units of nitrogen (preplant), and the beets were irrigated up. A second irrigation immediately followed the first. After thinning, the beets were divided into blocks and given different amounts of nitrogen as ammonium sulfate. Final levels of nitrogen in the plots were 60, 120, 180, and 240 pounds per acre. Imposed on the four nitrogen rates were three irrigation frequencies which began with the second irrigation after thinning.

The irrigation frequencies, which were by the calendar, were 10, 14, and 21 days. The 14 day schedule was set up as the mean or normal frequency, the 10-day schedule was to supply more water than would be economical, and the 21 day schedule—designed to stress the beets. Between July 1 and September 1 the wet treatment received 7 irrigations, the medium 5, and the dry 3. Each treatment was replicated four times.

There was no visual water stress or wilting of any of the beets during the growing season. This fact is emphasized to show how undependable the trained eye is in determining water requirements Yellowing began to appear on July 15 in the beets which received only 60 units of nitrogen preplant. The areas receiving 120 units revealed decreased top growth on September 1.

The results of the first harvest are shown below:

INFLUENCE OF NITROGEN AND IRRIGATION FREQUENCY ON SUGAR BEETS

Woodland, California, 1962
Planted May 1 — Harvested September 24

Lbs. Nitrogen Per Acre	No. of Irrigations	Yield Tons/Acre	Sugar %	Tons Sugar Per Acre
	Wet			
240	10	24.8	13.9	3.34
180	10	24.1	14.0	3.26
120	10	23.7	14.7	3.37
60	10	22.4	15.6	3.37
	Medium			
240	8	24.5	12.7	3.01
180	8	25.6	13.9	3.43
120	8	23.8	14.1	3.24
60	8	23.4	14.3	3.32
	Dry			
240	6	22.3	14.1	3.03
180	6	19.5	14.6	2.75
120	6	20.8	15.3	3.08
60	6	19.7	15.8	3.00

Continued on Page 24

WHAT DETERMINES ROW SPACING?

By DR. RUSSELL T. JOHNSON

Vice President, Spreckels Sugar Company

IN CALIFORNIA, there are two general classes of sugar beet row spacing—wide and narrow. The wide class includes evenly spaced rows, from 26 to 30 inches apart. The narrow class includes evenly spaced rows 20 to 24 inches apart, or odd-spaced (double row beds) which average 20 inches apart, such as 12″—28″, 14″—26″ or 16″—24″. In this discussion, the two classes are referred to as "20 inch" and "30 inch."

It should be emphasized that these row spacings have nothing to do with "bed planting" or "flat planting." These terms were, many years ago, associated with two-row beds and evenly spaced rows on the flat (now almost obsolete except with sprinkler or sub-irrigation).

Recently, there has been considerable discussion focussed on an apparent trend toward wide row spacing. Since there was *no* wide spacing 30 years ago, and *some* wide spacing at the present time, the existence of a "trend" is undeniable. But this does not prove that wide spacing is better, or that it will eventually supersede narrow spacing completely.

A history of California sugar beet row spacing might be outlined as follows:

1870-1923- All beets planted on 18″-26″ row spacing (Horse-drawn equipment in exclusive use).

1923- First tracklayer tractors with 40″ tread established 14″-26″ bed planting in Salinas Valley vegetable fields.

1938- First "wide row" sugar beet planting in Kern County to fit potato equipment set up for 28 inch spacing on raised beds.

1944- Imperial Valley beet growers tried 40″ single row beds to save labor; low yields led to compromise of 30″ spacing in 1945.

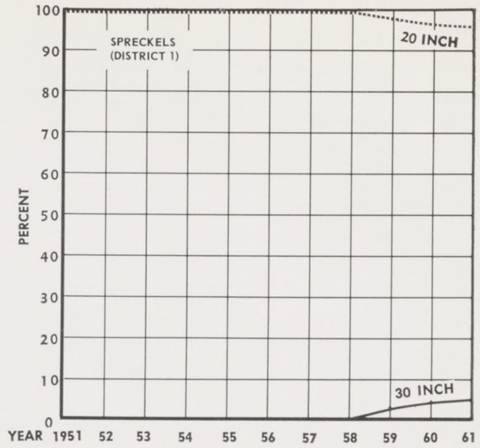
1948- San Joaquin Valley growers in Tracy area adopted 30″ spacing.

1957- Wide and narrow spacing about equal in State acreage.

These historical highlights point to the fact that changes in row spacing *away* from the old-established 20 inch spacing were made for reasons of expediency, and not in an effort to obtain maximum yield and sugar percentage.

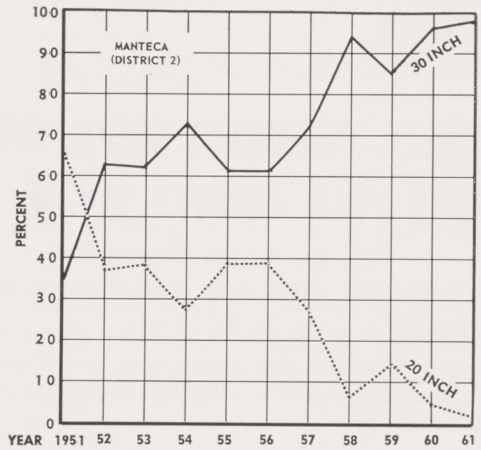
WHAT SPACING FOR MAXIMUM YIELD?

There have been numberless experiments performed to answer this question, and all the answers are in close agreement — maximum tonnage *and* sugar percentage are generally associated with high plant population (meaning about 40,000 beets



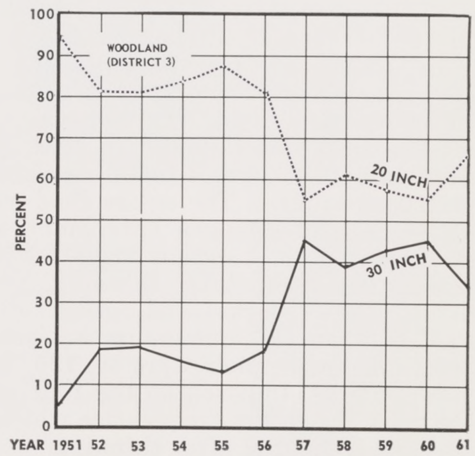
51

THE COASTAL VALLEYS still adhere to two-row beds, 14″-26″ spacing.



52

SAN JOAQUIN VALLEY growers showed a preference for wide spacing, although in Kern County there is now a trend back to 2-row beds.



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SACRAMENTO VALLEY growers continue to favor narrow spacing of rows, mainly two-row beds.

per acre.) Such a high population is possible only with row spacings averaging 20 inches, and with beets spaced 8 inches apart down the row.

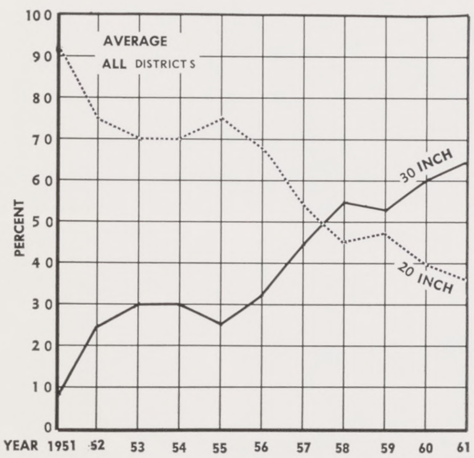
The importance of high population becomes greater as the growing season becomes shorter. Many experiments have proved that beets harvested up to 15 months after planting tend to reach the same tonnage regardless of population. *But sugar percentage is always greater with higher population.*

Except for beets planted with the intention of overwintering, the growing season has trended in the direction of shorter time. Early harvest in the Southern San Joaquin Valley, and late planting in the Sacramento Valley are recent changes in the growing season pattern. In these areas, narrower row spacings have proved their superiority, and there was actually a reversal of the trend toward wider spacing during 1962 and 1963.

Records of row spacings used by Spreckels growers in its three factory districts have been kept since 1951. These figures have been tabulated and plotted for each factory district, and for the total of all Speckels growers.

It is seen on the last curve, representing all Spreckels growers, that wide and narrow spacings became equal in acreage in 1957, and that by 1961, 63% of Spreckels growers were planting their beets on wide spaced rows. Preliminary data for 1962 and 1963 indicate that there is a marked reduction in wide-row planting in Kern County, so that it is not unreasonable to predict that Spreckels growers will, in the foreseeable future, be about equally divided in their choice of row spacings.

The choice is up to the grower—he knows from experience which row spacing best fits in with his equipment and with his other crops. But if high yields and high sugar percentage are to influence the choice, there may be a marked reduction of wide row acreage in the more distant future.



54

THE AVERAGE Spreckels grower has shown a growing preference for "wide" (28" or 30") spacing from 1951 to 1961.

GIB MAURER TO BAKERSFIELD OFFICE

55

Joseph G. (Gib) Maurer has been named Agricultural Superintendent for the Spreckels Sugar Company's Bakersfield district. He will oversee Spreckels agricultural activities in Kern County, one of the major sugar beet supplying areas for Spreckels new Mendota factory.

Gib was formerly agricultural field superintendent in the Woodland district and has been associated with Spreckels Sugar Company since 1952. He is a graduate of the University of California at Davis.

In Woodland, Gib and his wife, Marian, have been active in community affairs.

He is presently vice president of the Woodland School District Board of Trustees. He has also been active in the Woodland Chamber of Commerce and a recipient of the Chamber's "Key Man" award. He is past president of the Carlton Club and has worked with the Boy Scouts and Babe Ruth League.

Mrs. Maurer is president of the Woodland Memorial Hospital Auxiliary, a member of the Children's Home Society of California, and is active in the PTA and other civic groups.

The Mauers have two children—Christine 9, and Katherine, 6.

Notes from Our Field Men

J. W. HULL — MANTECA

56

Mr. Henry Baumgartner of the Collegeville area purchased a new International beet digger about eighteen months ago and had nothing but trouble in making it do a satisfactoy job in heavy soils.

He modified the machine by using a tongue to make it a true pull type, welding the crazy wheels so that they ran in the direction of harvest, and replaced the Rienks rolls with a set of spiral rolls running at right angles to the beet rows.

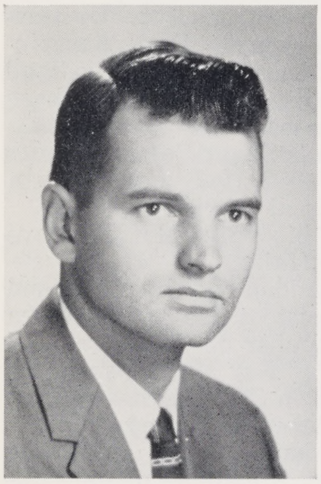
(*Continued on next Page*)

The harvester now is much easier to keep on the row and does a much cleaner job of digging than it did formerly.

He got together with his neighbor, Bill Burgess who took the idea a little farther and produced the one row self propelled harvester described elsewhere in this issue.

Much credit should go to growers who will spend the time, energy and money to try and improve the quality of beets sent to the factory. In this case these men have come up with completely successful machines that are simple and extremely efficient.

ROGER McEUEN — MANTECA

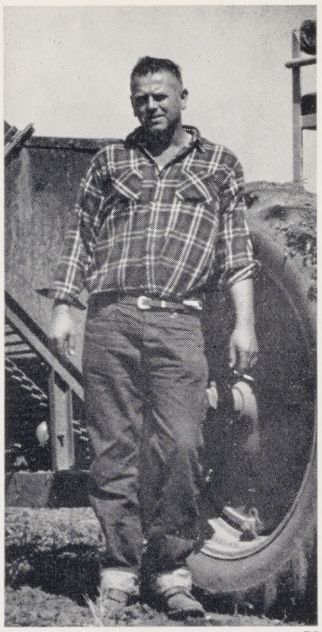


57

One of our more industrious growers, William Burgess, who saw the need for a lifter-loader harvester which would do a good cleaning job in our heavy adobe soils, has come up with a good machine.

This machine has very few moving parts, is simple, and actually went out and dug beets the very first time with no modification. It is mounted on a high-clearance wheel tractor.

It incorporates the use of two pairs of spiral rolls which are 68″ long. These rolls receive the beets from the lifter wheels and elevate them and move them to the rear where a potato chain elevates the beets into the truck.



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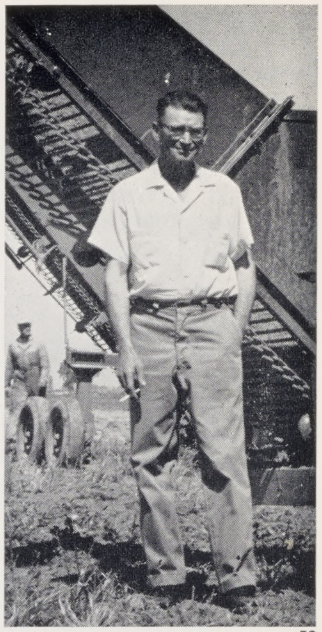
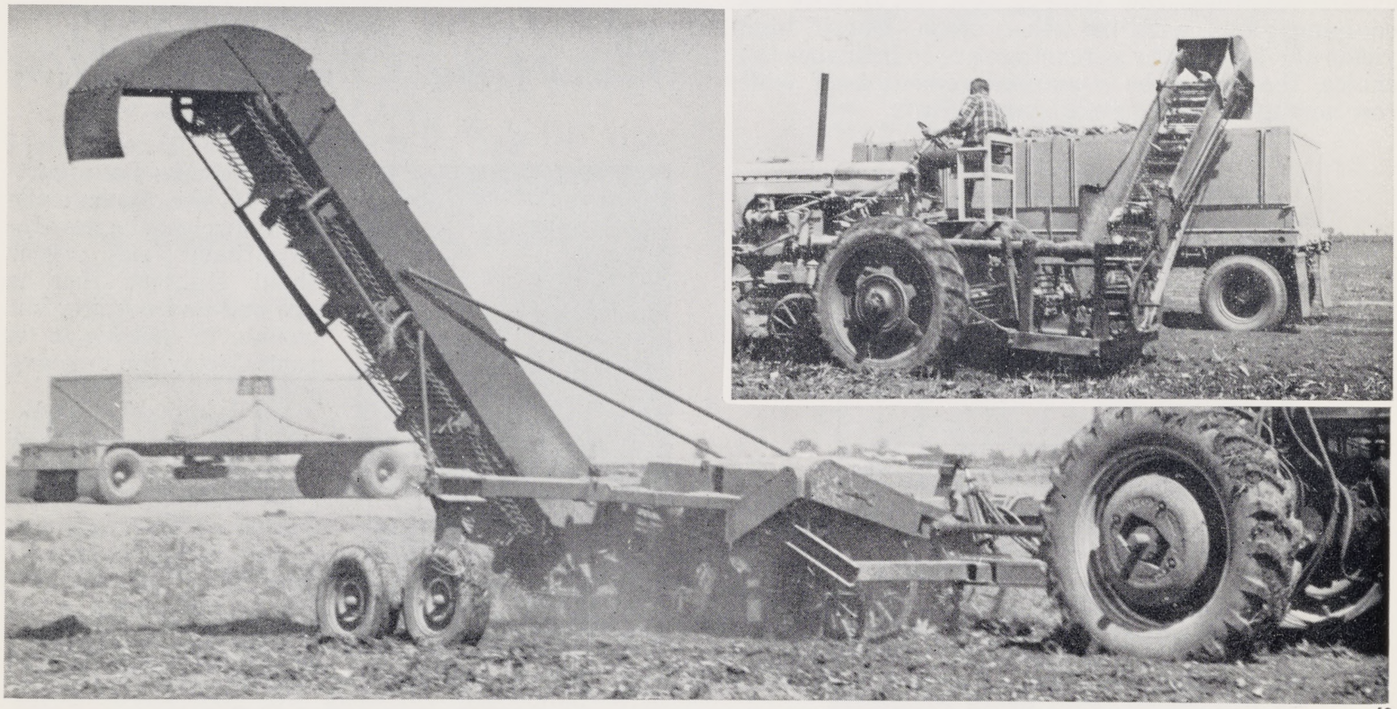
WILLIAM BURGESS



59

HENRY BAUMGARTNER

Without the use of the spiral rolls, the lifter-loader machine is almost worthless in wet conditions in adobe soils. However, with rolls installed, these machines are probably the best thing going for us right now. They will, under adverse conditions, consistently deliver less than 800-1000 lbs. of dirt to a set of doubles or less than 300-400 lbs. to a bobtail load. This is quite a remarkable difference because these same lifter-loader machines were loading 4000-8000 lbs. to a set of doubles and 2000-4000 lbs. for a bobtail before installation of spiral rolls.



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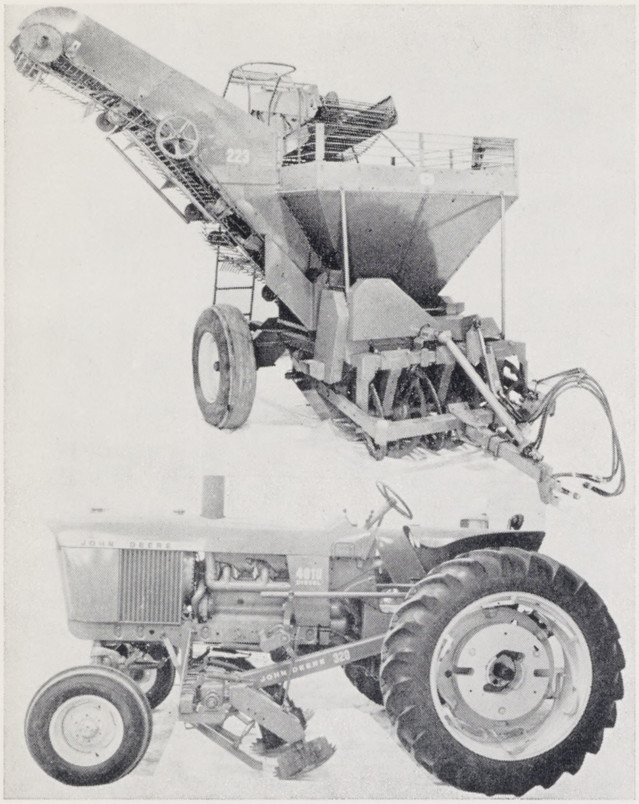
HENRY BAUMGARTNER'S converted International and (inset) William Burgess' completely homemade harvester.

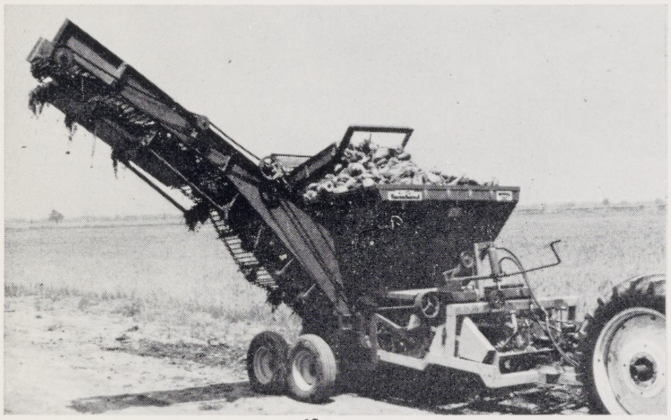
HARVESTER MANUFACTURERS PRESENT 1963 MODELS



John Deere Photos 61

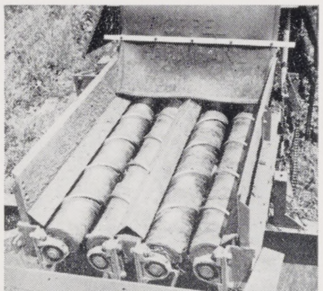
ABOVE—the John Deere Model 223 two-row lifter-loader for 1963.

BELOW—the John Deere Model 320 two-row disk topper. The topper unit alone (Model 32) can be installed in the lifter-loader to make a single, once-over two-row harvester.



62

FARMHAND 2-Row Cart Model (above) has self-contained disk topping units. Cleaning rolls (Right) effectively remove dirt and trash.



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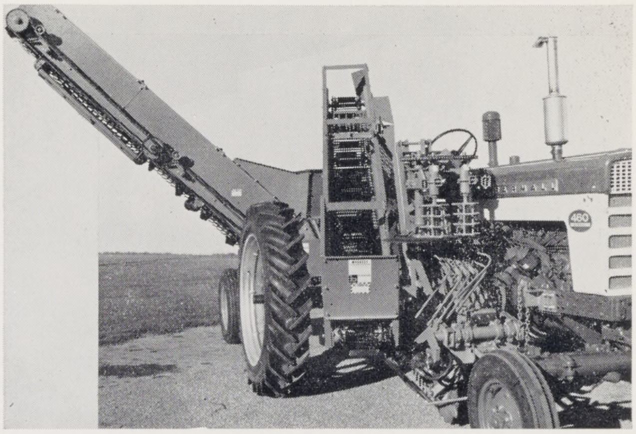

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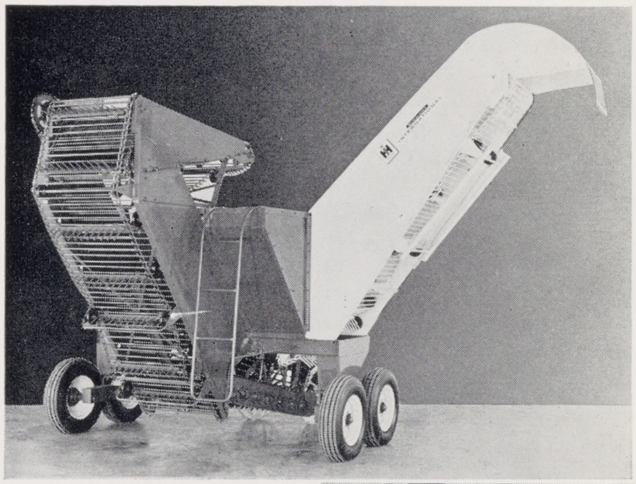
Blackwelder Mfg. Co. Photos 65

ABOVE—the Marbeet Model G single-row harvester for 1963.

BELOW—the Twin-Row Marbeet harvester for 1963.



International Harvester Photos 66

ABOVE—the International No. 24 tank-type lifter-loader for 1963. RIGHT—a detail of the hydraulically steered lifter unit.

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MODERATE NITROGEN, AMPLE WATER

Continued from Page 19

The results indicate that although no stress was apparent due to the need of water when the beets were irrigated every 21 days, there was an average decrease in tonnage of approximately 4 tons per acre for all dry treatments, and the sugar per acre was reduced 0.4 tons when compared to the yields when the beets were irrigated every 10 days.

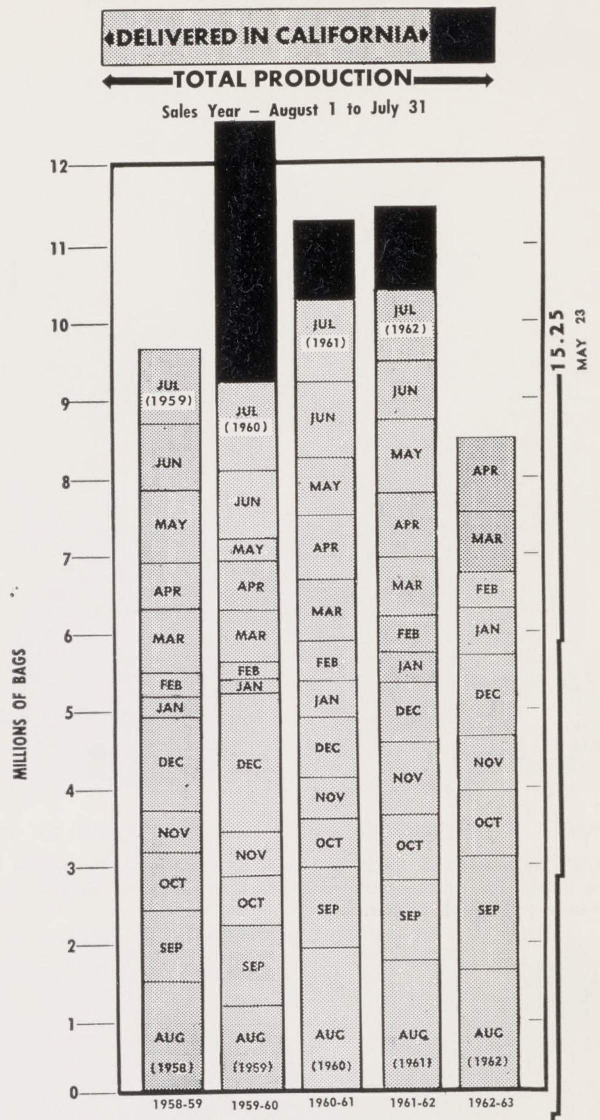
Additional nitrogen above the basic 60 units per acre did not increase the sugar yield. The effect of each additional 60 units was to *decrease* sugar percentage by 0.5 point and to increase the tonnage of beets by less than one ton per acre. The net effect was that the sugar yield per acre was actually decreased by each additional nitrogen increment above 60 pounds per acre. A subsequent spring harvest has shown that this trend remained, and that a need for more than 60 pounds of nitrogen never developed. There were great increases in the yield of sugar when the beets had been nitrogen deficient, both visually and by petiole nitrate analysis, for more than seven months.

Conclusions which may be drawn from this experiment are:

1. An irrigation interval schedule of about 14 days throughout the summer will give the best returns on heavy soils whether it is a "hot" year or a "cool" year. On lighter soils the interval might be decreased to 7-10 days. The beets should *never* be allowed to show water stress.
2. The nitrogen applied should be held to a level where the plant will use all of it and still have time to store sugar. A yellowing appearance does not always indicate that the beets need additional nitrogen, even if harvest is to be several months later. The character of the soil, the past fertilizer history, and the planting date of the beets are all to be considered in chosing nitrogen rates.

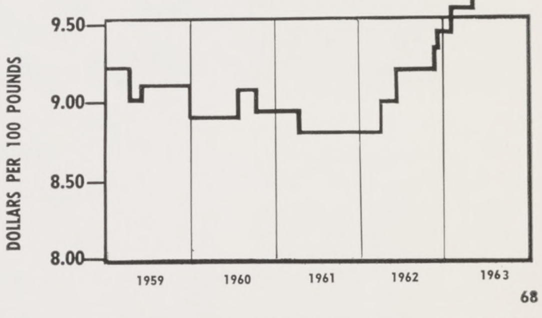
Nitrogen and water should be applied to beets at a level which gives the highest *net* return. Their effect on both tonnage and sugar percentage must be considered. It is very likely that most fields which are to be planted to beets need between 100 and 50 units of nitrogen but this experiment has demonstrated that much lower rates sometimes give the best returns.

PRODUCTION AND DELIVERIES OF BEET SUGAR IN CALIFORNIA



QUOTED PRICE OF BEET GRANULATED SUGAR

In 100 Lb. Paper Bags, F.O.B. San Francisco



The SPRECKELS SUGAR BEET BULLETIN is issued bi-monthly by the Agricultural Department of the Spreckels Sugar Company as a service to its growers.
Mention of specific methods, devices and implements does not constitute an endorsement by the Company.
All photographs by the editor unless otherwise indicated.

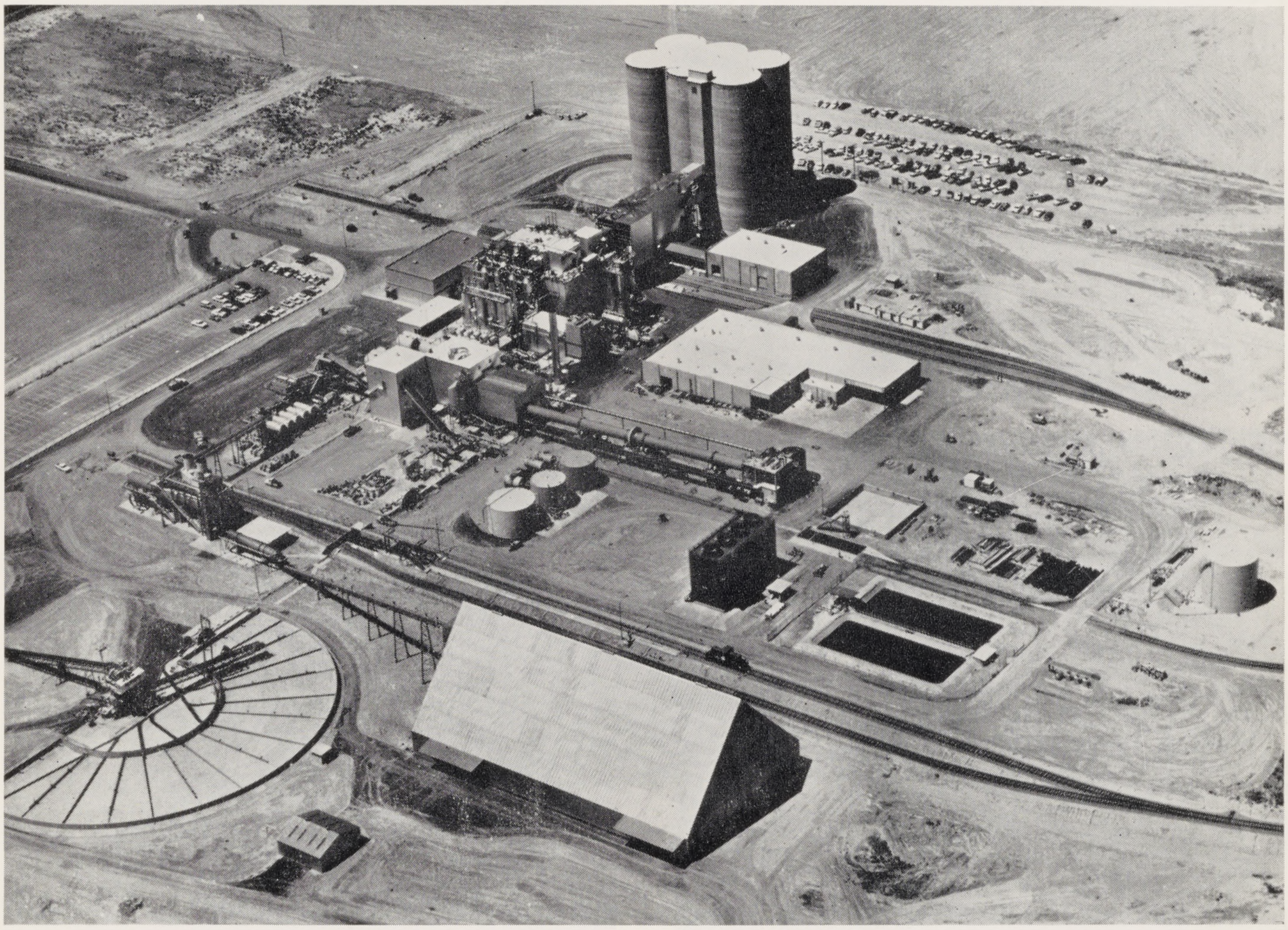
AUSTIN ARMER, EDITOR SPRECKELS SUGAR COMPANY WOODLAND, CALIFORNIA

SPC - DAVIS

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

SPRECKELS SUGAR BEET BULLETIN

VOL. 27 JULY-AUGUST, 1963 NO. 4



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SOMETHING NEW

in beet sugar factories - new in concept, new in design.
Sugar beets from San Joaquin Valley growers will be processed at
Spreckels Sugar Company's

MENDOTA FACTORY

SPRECKELS SUGAR COMPANY'S NEW MENDOTA FACTORY IS DEDICATED

THE SPRECKELS SUGAR COMPANY displayed to the public its new $16.5 million beet sugar factory at Mendota on July 13.

The facility, which has been under construction for 22 months, is the first new beet processing plant to be built in the United States in nearly ten years.

The public dedication was a gala affair. The already colorful factory was resplendent with decorative banners, and a brilliant purple backdrop set off the speakers' platform.

Master of Ceremonies was Spreckels Vice President William H. Ottey. Principal speaker at the public dedication was John P. Duncan, Jr., Assistant Secretary, United States Department of Agriculture. Others on the program included B. F. Sisk, United States Representative, 16th District, Fresno; Charles Paul, California Director of Agriculture; Gordon Lyons, Executive Manager, California Beet Growers Association; Guy D. Manuel, President, Spreckels Sugar Company; and other Spreckels officials. The facility was open to the public until 6:00 p.m. Further public viewing will not be possible until the factory is in operation.

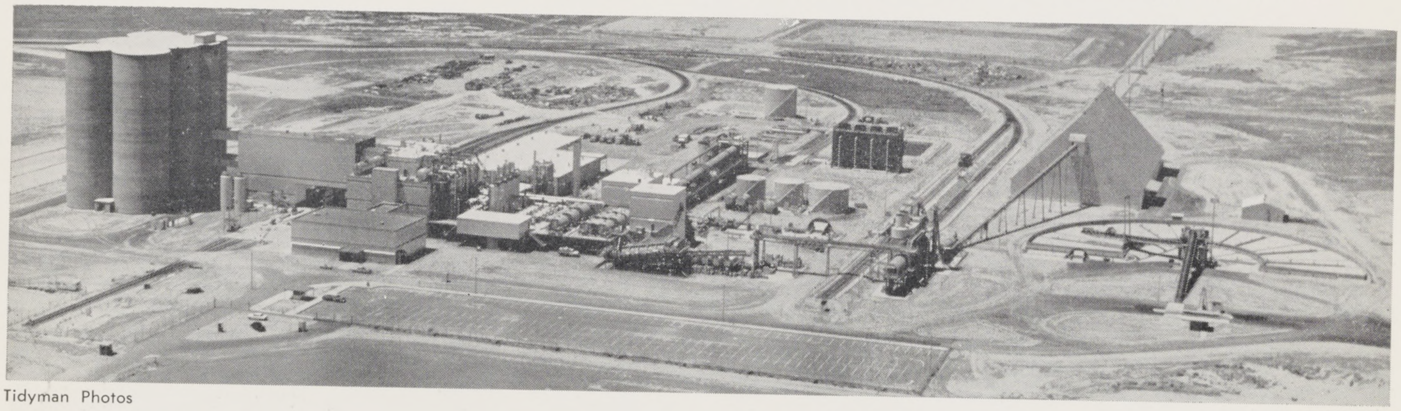
Although the nation's newest sugar factory embodies many major technological advances in sugar manufacture, perhaps the most significant difference between this new factory and older plants has to do with the marketing end of the sugar business, not the production end.

No consumer sized packaging equipment is in evidence at the big beet sugar factory. Approximately 98% of the factory's output will leave the Mendota facility as bulk sugar — either in granulated or in liquid form.

The new beet sugar factory will favorably affect the economy throughout the Central San Joaquin Valley and beyond.

The farm value of this year's crop due to be processed at the new factory is estimated at more than $12,000,000. Sugar beets will come principally from Kings, Merced, Tulare, and Fresno counties. Kern county will also serve to supply the new facility at the start of future campaigns.

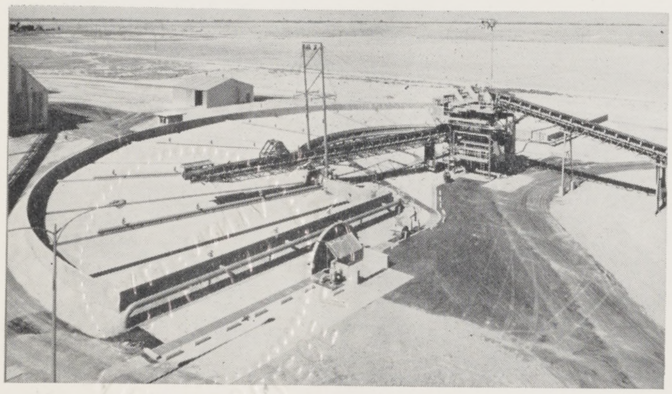
New receiving stations to handle the expanded acreage are now in operation at Kearny Park, Burrel, Goshen, Octol, Buttonwillow, and Conner.



Tidyman Photos

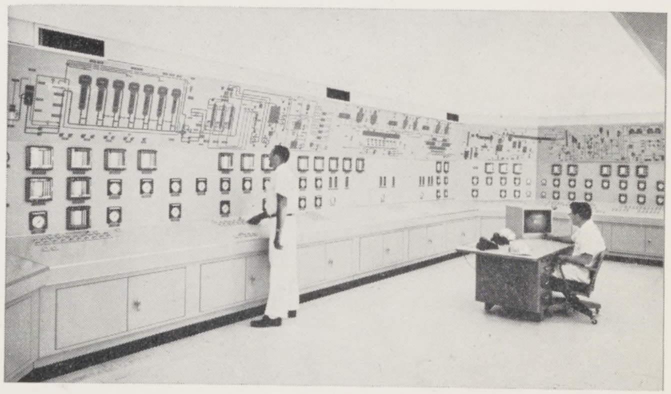
70

THIS AIR PHOTO shows the near-completed Mendota factory. Beets will be received and stored on the semi-circular slab (right) and flumed into the beet end. Factory design features open-air processing elements, except for enclosed air conditioned sugar end, offices and laboratory.



71

RECEIVING STATION delivers beets over World's largest nip-roll cleaning screen and into a semicircular pile. Beets are removed from pile by high pressure water jets and flumed past regulating wheel, rock catcher and trash catchers.



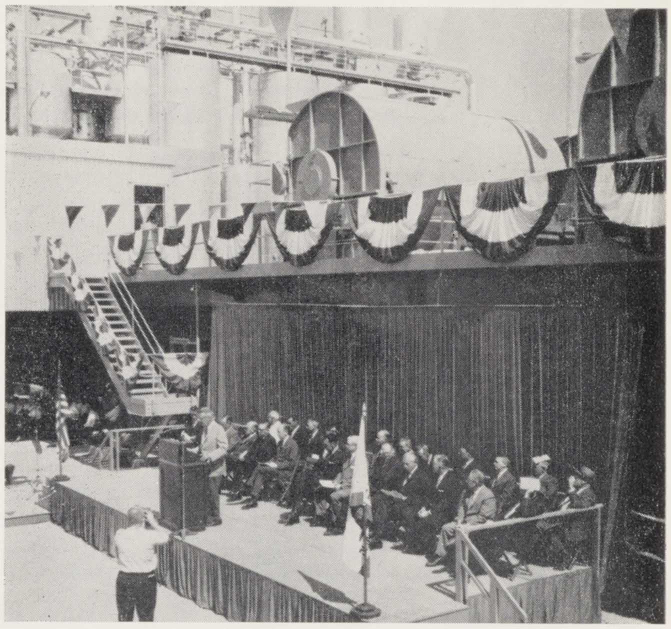
72

NERVE CENTER of factory is this control room. Light-animated flow sheet surmounts recording and indicating process-control instruments. Closed-circuit television from laboratory completes this complex of process and quality control.

FACTORY 4 DEDICATION CEREMONY, JULY 13, 1963

73

AUDIENCE was a part of the 5,300 guests who responded to the dedication invitation.



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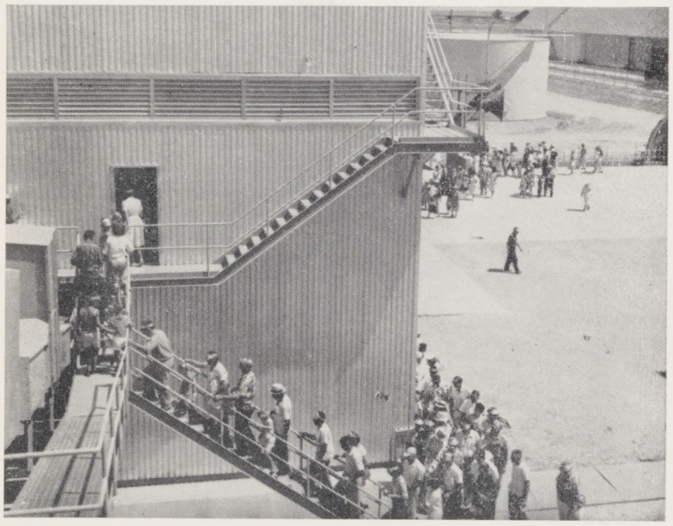
WILLIAM H. OTTEY, Vice President of Spreckels Sugar Company, was Master of Ceremonies. He introduced the speakers.

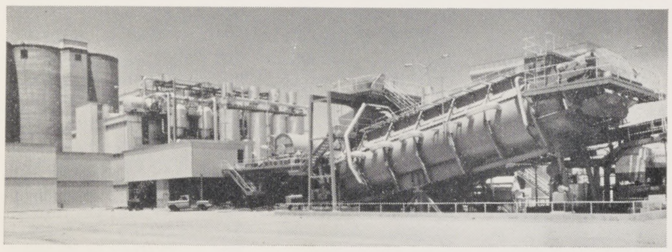


74

FACTORY TOUR past gleaming and colorful process stations was part of dedication program.

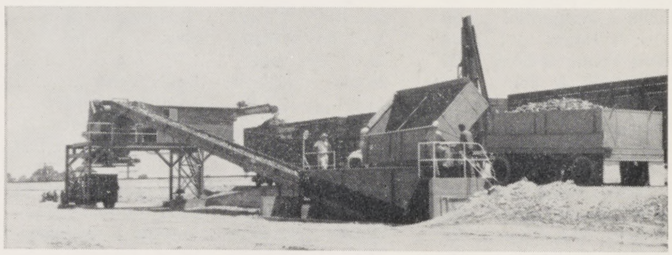
77

COTTON CANDY for the youngsters, food and cold drinks for all, were at tour's end.



75

SLOPE DIFFUSER is a processing innovation — it will maximize sugar extraction.



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OCTOL RECEIVING STATION is one of six new San Joaquin Valley receiving facilities.

The 1962 Honor Roll

We proudly present this list of growers whose 1962 crops (including those harvested in 1963) yielded 25 tons per acre or more. No single issue of SPRECKELS SUGAR BEET BULLETIN has ever before contained so large a list.

DISTRICT 1 — SPRECKELS

Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
West Coast Farms	42	37.64	10,464
D'Arrigo Bros. of Calif	45	33.76	9,088
Frassetti Bros.	15	33.26	10,477
Harry R. Semas	60	32.35	8,851
Fujjii Bros.	5	32.29	6,794
L.C.H. Co.	20	32.13	8,733
H. F. Trafton & Son	82	30.92	9,313
F. V. Birbeck Co.	15	30.16	9,108
Wm. D. Crinklaw	104	30.09	8,197
Gill Bros.	35	29.85	7,367
Bruce Church, Inc.	64	29.62	6,540
Leon Digges	23	29.57	8,262
J. V. Franscioni	18	29.50	7,434
Matteucci Bros.	6	29.45	8,605
W. B. Grainger Pkg. Co.	27	29.44	9,232
Latasa Bros.	35	29.29	8,488
William Whitney	13	28.99	8,743
Owen T. Rice & Son, Inc.	100	28.82	9,355
Latasa Bros.	110	28.72	8,984
James H. Taylor	10	28.62	9,181
Ferry-Morse Seed Co.	62	28.39	8,983
Joseph B. Silva	27	28.38	7,033
Joe Alves	25	28.16	7,519
Taylor & Digges	43	27.87	8,450
Robert Thorp	18	27.76	9,005
Manuel Dias	4	27.65	7,958
West Coast Farms	30	27.32	8,032
Silveria Bros.	20	27.30	7,595
West Coast Farms	20	27.27	7,952
W. M. Sullivan	73	27.21	8,212
Growers Produce Dispatch	34	27.13	8,443
R. G. Wood	11	26.94	8,206
Obata Bros.	64	26.85	7,518
Ray & Norman Recht	18	26.78	8,795
K. R. Nutting Co.	66	26.75	7,881
Tom DaRosa	66	26.60	7,714
Fabretti & Dedini	50	26 57	7,312
John Gardoni	26	26.46	7,890
D'Arrigo Bros. of Calif	83	26.41	8,235
Lemos Bros.	35	26.40	7,107
G. W. Herbert & Son	64	26.36	7,581
Art Manzoni	18	26.38	6,777
Latasa Bros.	39	26.24	8,019
Burke Farm Co.	28	26.23	7,287
Frassetti Bros.	18	26.18	7,854
Robert A. Smith	28	26.16	5,441
Richard Morgantini	30	26.14	7,926
Jack A. Hayes	84	26.13	7,860
Ning Young & Sons	38	26.07	8,092
V. Vanoli & Son	45	26.01	6,332
Lindeleaf Bros.	22	25.97	7,547
Peter A. Stolich	17	25.80	7,446
Matteucci Bros.	11	25.68	7,663
Fred Del Razo	81	25.06	7,293
Jack A. Hayes	29	25.64	7,077
Porter Berry Farms	26	25.57	6,822
Botelho Bros.	22	25.54	8,295
Phillips Wyman	26	25.51	6,893
A. J. Glau & Sons	15	25.43	7,242
John Oreggia & Co.	21	25.36	7,243
Jack A. Ferrasci	55	25.34	6,523
Bellone & Del Chiaro	33	25.33	7,634
Raymond Martin	160	25.28	7,311
Wm. D. Crinklaw	104	25.26	6,421
Sgheiga Bros.	24	25.34	7,736
R. B. Little	101	25.19	7,597
J. M. Thorne	35	25.18	6,970
Tony L. Silveira	18	25.17	6,846

DISTRICT 2 — MANTECA

Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
San Julian Bros. & Zabalza	80	37.44	10,551
E. A. Parker	5	37.16	10,851
John C. Maures & Sons	66	36.99	9,899
Merlin Miller	37	36.87	10,714
Tanaka Farms	155	35.60	10,488
Henry Westing & Son	73	34.27	9,582
Calcagno Farms	40	34.27	9,308
A. Pellegri & Son	26	34.17	10,832
Manuel L. Costa	50	33.83	10,359
Geo. Tomura	48	33.79	9,704
A. Pelligri & Son	41	33.53	10,468
Tony A. Sanchez	74	33.23	9,584
Enrico Pizzi	7	32.84	8,818
Edward Maberto	63	32.81	9,672
Tony A. Sanchez	82	32.61	9,105
Tom Hiraga	24	32.56	10,185
F. L. Williams	48	32.49	6,979
A. Pellegri & Son	43	32.16	9,178
Giannecchini Bros.	27	31.80	8,859
Fumio Nishida	96	31.74	9,027
D. & A. Togninali	43	31.45	8,875
Geo. H. Clever	28	30.95	7,744
Wm. F. Garden	26	30.82	9,745
Henry H. Crawford	50	30.56	9,345
Geo. Tomura	15	30.54	9,693
Anthony Alves	9	30.19	9,105
Dasso Bros.	39	30.19	8,725
Henry Westing & Son	107	30.02	9,594
Steve Galanti	41	29.92	8,677
Kaiser & Lindeman	119	29.66	8,762
Garry Fisk	2	29.52	8,153
Hanson & Barkley	46	29.45	8,694
A. Pellegri & Son	40	29.25	7,944
Lauri Filippini	48	29.16	8,404
Maciel Bros.	77	29.08	8,811
Clarence Nilsson	36	29.07	8,355
Sousa Bros.	95	28.95	7,591
Tony A. Sanchez	49	28.83	7,640
Guerrini & Danilano	102	28.53	7,994
Vladimir Vuinovic	20	28.54	8,305
Dexter Bros.	30	28.48	9,233
Robert Norman	47	28.28	8,676
Giannecchini Bros.	50	28.22	7,027
Geo. & Charles Hansen	20	28.14	8,042
Davis Vana	33	28.11	7,511
Frank Ormonde	67	28.06	9,086
Louis W. Pelluca	22	28.06	7,902
Maciel Bros.	107	28.05	7,602
Ishida Bros.	48	28.04	8,054
Henry Westing & Son	30	27.82	8,096
Al Fonseca	49	27.79	8,131
Thomas E. Alderson	123	27.76	7,312
W. F. Pierson	25	27.72	8,388
Melvin A. Baumbach	136	27.55	7,990
A. & R. Lagorio	62	27.50	7,222
H. M. Hunt & Son	28	27.42	8,193
Lester Rodgers	85	27.37	7,428
Roy Craven	83	27.31	6,472
Jack Kimoto	78	27.16	8,468
S. Nogare	20	27.10	7,599
Ben Fujii	50	27.05	8,093
John L. Miller	60	27.00	8,809
Bogetti Bros.	164	26.99	8,129
Chris Bucchetti Son	40	26.94	7,840
Giannecchini Bros.	58	26.94	8,405
James A. Luis	112	26.84	8,245
Hanson & Barkley	60	26.74	8,333
Robertson & Sons	75	26.81	7,914
John Bertaina	48	26.93	8,543
Vladimir Vuinovic	10	26.69	7,505
John L. Miller	36	26.55	7,137
Herman Ehlers & Son	100	26.51	7,561
Sousa Bros.	95	26.23	6,794
Merlin Miller	17	26.17	7,212
Robertson & Sons	65	26.08	8,643
G. R. Ripken	62	26.01	7,470
John Celle	75	25.99	7,262
Guido Biagi	36	25.90	7,242
Geo. & Charles Hansen	23	25.85	7,052
John O. Paulson	61	25.81	8,166
Hanson & Barkley	166	25.62	7,824
Richard A. Paulson	5	25.53	7,996
Takemori Bros.	35	25 45	7,213
Ed Thoming	70	25.34	7,480
Joe F. Soares	47	25.28	6,780
Murata Bros.	39	25.13	7,785
Stuart R. Clever	28	25.03	7,744
W. Theodore Pierson	23	25.03	6,968
Grant & Wilson	79	24.99	7,507
Sheldon E. Moore	63	24.98	7,274

DISTRICT 3 — WOODLAND

Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
M. & T. Farms	30	45.02	13,254
Martinelli Bros.	78	41.43	10,921
Oji Bros.	140	39.27	10,477
Pereira Bros.	25	38.40	9,254
E. L. Wallace & Sons	76	37.31	9,425
Hatcher & Hanks	44	37.07	10,375
Heidrick Bros.	90	36.30	10,512
Anderson Bros.	61	35 52	9,455
Robert C. Schulze	41	35.51	10,333
James N. Fulmor	30	35.13	8,621
C. G. & T. H. Roth	32	35.11	10,070
Anderson Bros.	34	34.40	9,412
John J. Vanetti	61	34.29	9,485
Eldred R. Reel	93	34.19	8,052
Neat Sawyer	52	34.03	9,528
Wetzel Bros.	94	33.83	8,363
Floyd E. Warner	51	33.81	10,244
Vernon E. Eriksen	58	33.79	9,059
Dela Torres Bros.	100	33.61	8,665
Van Smith	153	33.54	9,988
Giannoni Bros.	74	33.52	9,574
Robert C. Gill	73	33.49	8,111
James I. Tadlock	36	33.34	9,602
M. Martinez	77	32.20	8,623
Schroeder Bros.	40	32.07	9,473
Joseph L. Nomellini	101	32.07	9,191
Dela Torres Bros.	75	32.04	9,099
Tsuji & Inouye	40	32.03	7,437
George M. Struve	386	31.99	8,605
C. M. Ordonez	72	31.97	8,888
Robert Leslie Button	74	31.95	8,192
Orth Bros.	47	31.84	8,457

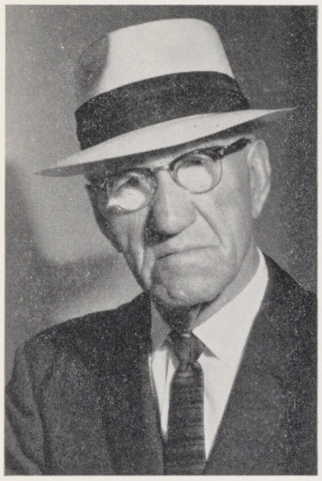
Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
Orth Bros.	61	31.80	9,095
George M. Struve	98	31.63	8,040
Danielson & Pringle	51	31.51	7,569
Emmett Heidrick	12	31.40	7,379
James I. Tadlock	35	31.34	8,756
Wilson Lovvorn	79	31 30	8,820
John J. Vanetti	85	31.28	8,758
Wallace Bros.	37	31.26	7,809
Geo. H. Morita	120	31.22	8,030
J. H. Braden	37	31.12	7,836
George M. Struve	30	30.84	8,253
C. E. Frazier	73	30.78	6,956
Vernon E. Eriksen	51	30.77	9,625
Arnold Collier	45	30.77	8,000
Carl Wiegand	35	30.68	9,008
Frank E. King	81	30.54	6,762
Henry Rehrmann	108	30.47	9,001
John E. Jackson	22	30.40	7,478
Oji Bros.	59	30.37	7,696
Elwood M. Olson	25	30.24	5,824
Richard Moore	80	30.22	8,413
John E. Jackson	18	30.14	7,806
Nishikawa Bros.	113	30.10	7,224
Carl Hahn	130	30.80	7,261
Dora Fortis & Son	102	30.00	8,514
Ernest J. Weyand	20	29.99	6,970
Roger D. Moore	50	29.88	6,699
Paul W. Reiff & Sons	171	29.76	8,374
George Taxara	80	29.69	7,761
C. G. & T. H. Roth	71	29.64	8,465
Tsuji & Inouye	35	29.59	8,368
Geo. T. Dakuzaku	33	29.49	9,590
M. B. Avilla	72	29.45	8,747
Edgar Jang	56	29.33	7,415
Dela Torres Bros.	24	29.24	7,585
Meek & Le Maitre	77	29.14	8,369
Noburo Hitomi	50	29.11	6,398
Chuck Sakurada	73	29.08	7,805
Robert Leslie Button	70	29 00	8,613
E. L. Wallace & Sons	60	28.88	7,803
Kataoka Bros.	48	28.86	7,815
Harlan & Dumars	71	28.70	8,713
Rudy Howald	71	28.68	7,342
John J. Vanetti	71	28.57	7,931
Sagara Bros.	51	28.53	7,669
Schoeningh Bros.	5	28.52	6,005
Wallace Bros.	149	28.48	8,236
Edgar Everett	72	28.48	8,003
Solano Farms	46	28.46	8,310
Schneider, Fricke & Schneider	36	28.44	7,286
Schoeningh Bros.	80	28.44	7,047
Pete Konitzer	82	28.25	7,752
Wallace Bros.	354	28.07	7,613
S. Yamamoto	32	28.05	5,665
Max Toledo	329	28.04	7,812
Chuck Sakurada	35	28.02	6,921
Clark Davis	41	27.95	7,340
George Taxara	39	27.94	6,918
M. B. Avilla	79	27.92	8,147
Heidrick Bros.	80	27.90	8,253
Dixon Dryer Co. & M. Sanchez	5	27.89	8,339
Edgar Everett	72	27.83	8,104
Fred Bender	98	27.82	7,278
Jimmy Leong	71	27.76	8,105
Solano Farms	69	27.73	7,676
Rudy Howald	142	27.72	6,719
Tom Sanchez	47	27 70	8,111
Nick Samborsky	68	27.69	7,055
James M. Campbell	86	27.61	8,128
Ralph W. Pollock	61	27.59	7,521
Jack Perry	25	27.56	6,879
Eugene G. Cain	50	27.50	7,058
Elwood M. Olson	37	27.47	6,235
Howard Bros.	150	27.46	8,007
J. R. Phillips	42	27.41	7,697
Albert E. Tandy	77	27.34	7,704
Wilson Lovvorn	85	27.32	7,622
Keith B. Nelson	165	27.30	8,103

Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
Glenn E. Morris	81	27.11	7,461
J. W. Jones	77	27.08	7,604
Oji Bros.	86	27.06	7,301
Schneider, Fricke & Schneider	37	26.98	6.065
Fred Damsen	17	26.95	7,972
Chase Low	26	26.92	7,355
E. M. Ullrich	100	26.89	7,739
Heidrick Bros.	202	26.88	7,752
Regents Univ. of Calif.	65	26.88	7,381
John W. Brazil	60	26.86	6,715
Nishikawa Bros.	55	26.76	6,995
Donald Fong	32	26.71	7,949
Vernon E. Eriksen	37	26.70	8,053
Chew Bros.	74	26.67	7,174
H. F. Kalfsbeek	30	26.66	8,105
Keith B. Nelson	18	26.65	7,249
R. M. Farnsworth	120	26.64	7,331
C. E. Frazier	70	26.62	7,922
Ferreira Bros.	83	26.59	6,515
Chew Bros.	245	26.57	7,036
Evergreen Farms	22	26.57	6,510
W. B. Meng	40	26.48	8,267
Michael Merkley	54	26.48	7,399
Takeuchi Bros.	38	26 45	5,819
N. F. Lammers	39	26.42	8,026
Dumars & Harlan	106	26.41	6,999
Robert C. Schulze	47	26.39	7,595
Robert Leslie Button	75	26.29	7,377
James I. Tadlock	53	26.14	7,774
R. E. & R. H. Lauppe	15	26.08	7,188
Alvin J. Hermle	24	26.07	7,404
Richard Moore	121	26.04	6,905
Ralph O. Blann	36	26.04	6,729
M. G. Machado	55	25.99	6,830
Harley & Harvey Rominger	58	25.91	7,270
Wilson Lovvorn	105	25.86	7,329
William Duncan	36	25.86	7,122
Harlan & Dumars	137	25.83	6,731
Joseph W. Machado	57	25.82	6,185
Louis Parella & Sons	472	25.72	6,780
Robert C. Schulze	85	25.71	7,554
Chew Bros.	147	25.61	6,951
Joe Gnos & Son	71	25.60	7,521
Wm. Duncan	60	25.57	7,753
H. Weckwerth	11	25.45	6,938
George M. Struve	37	25.41	6,774
Howard Bros.	75	25.40	7,112
M. D. Anchita	75	25.38	7,690
Ralph Moss	27	25.38	6,807
Pete Konitzer	108	25.38	6,502
C. C. Whealey	80	25.32	6,897
Hamatani Bros. Farms	169	25.25	6,828
Dick & Gary Dettling	31	25.24	7,037
Louis Parella & Sons	315	25.22	6,941
Bernie Gorman, Jr.	38	25.17	7,319
Dixon Dryer Co. & M. Sanchez	89	25.17	7,073
Guido Romani	96	25.08	7,664
Dora Fortis & Son	39	25.05	7,760
R. L. Buckman	41	25.04	6,801
Morita Bros.	68	25.01	7,298
Henry Rutz	19	25.01	5,397
H. Weckwerth	6	24.99	7,407
Leroy Traynham & Son	70	24.97	6,752
Theodore Strehle	50	24.96	6,644
Joseph Sanchez	410	24.95	7,819

DISTRICT 4 — MENDOTA

Grower	Acres Harvester	Tons Per Acre	Lbs. Sugar Per Acre
Kenneth Peelman	54	38.63	10,538
Newton Bros.	20	38.25	10,679
W. A. Klepper	52	38.15	9,164
Newhall Land & Farm Co.	52	37.00	9,368
Vincent Kovacevich	75	36.93	10,111
Laura Jones	1	35.04	9,496
Gary Waller	37	33 04	8,630
James B. Gardiner	39	32.87	8,954
Harold J. O'Banion	107	32.80	9,400
Lee Roy Janzen	37	32.67	9,363
Ed Guisti	135	31.72	8,742
J. & J. Ranch	67	31.56	9,361
S. C. Pinheiro	71	31.18	7,477
Floyd Hudiburg	41	30.94	8,027
Turner Island Farms	204	30.86	9,573
Robert Cardwell	19	30.63	9,060
Red Barn Ranch	19	30 39	7,920
Garlow Bros.	71	30.15	8,454
Destefani Bros.	30	29.86	7,979
Pete Del Testa	28	29.81	8,180
Albert J. Perry	64	29.66	8,340
W. A. Klepper	50	29.56	8,082
Leo Wagenleitner	37	29.49	7,520
Ed. Guisti	47	29.33	8,177
Joe Garone	39	29.03	7,763
J. Howard Porter	74	28.98	8,172
Newhall Land & Farm Co.	74	28.97	7,770
Banducci Farm Co.	145	28.94	8,236
Paul Hanson	23	28.79	8,925
Leonard Frazier	72	28.66	8,443
Joe Souza	37	28.61	7,879
Costa Bros.	36	28.43	7,551
Edward Kezirian	40	28.29	7,616
J. E. Gossiaux & A. Pistoresi	40	28.25	7,967
Pameroy Farms	38	28.13	8,658
Mason Snow	72	28.12	8,234
Melvin McConnell	35	27.92	8,795
Tom Torretta	73	27.89	8,942
Elmer Suorez	72	27.77	7,531
A. F. Mendes & Sons	28	27.69	7,432
Des Jardins Bros.	49	27.60	9,169
Newhall Land & Farm Co.	30	27.50	7,057
Jack D. Jones	27	27.39	7,319
Markarian Farms	38	27.33	7,991
Banducci Farm Co.	153	27.17	7,928
Joe G. Banducci	97	26.98	7,290
W. R. Greenlee	39	26.94	8,345
Raymond N. Costales	36	26.91	7,906
Carl B. Swearingen	40	26.88	7,457
S. & D. M. Biancucci, Inc.	159	26.86	7,322
H. B. Fries	75	26.60	7,076
Newhall Land & Farm Co.	100	26.59	7,950
McCarthy-Hildebrand	95	26.45	6,263
H. Carey	18	26.29	7,414
J. Sanchez & Sons	342	26.24	7,594
Jack Jones	25	26.14	7,476
Gammon Bros.	39	26.05	7,281
Foglio Bros.	12	25.95	6,934
Edward R. Lewis	199	25.86	7,882
Destefani Bros.	13	25.86	7,070
Gordon Haycock	36	25.83	7,734
Davis & Huey	64	25.83	6,876
Newhall Land & Farm Co.	38	25.79	7,417
H. G. Fawcett Farms	51	25.73	6,932
A. F. Mendes & Son	14	25.73	6,474
Kenmar Farm	47	25.72	7,155
Newhall Land & Farm Co.	25	25.67	7,147
Newhall Land & Farm Co.	42	25 59	7,426
N. L. Ritchey	15	25.57	7,380
Frick Bros.	265	25.45	7,263
Mason Snow	70	25.42	7,575
Edward Kezirian	18	25.42	7,057
Floyd Hudiburg	30	25.40	7,275
Double L. Farms	38	25.26	7,386
Frank G. Hunter	35	25.24	7,900
Molatore Bros.	40	25.22	6,804
Bairstow Bros.	19	25.17	6,665
Garlow Bros.	34	25.05	7,831
William G. Silveira	84	25.01	7,663
Dale White	29	24.96	6,979

OUR TOP GROWERS FOR 1962



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MITCHELL RESETAR, SR.
District 1

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L. to R.—FLOYD SAN JULIAN,
LAWRENCE ZABALZA,
LAWRENCE SAN JULIAN
District 2

80

ALBERT and JOHN MARTINELLI
District 3

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KENNETH PEELMAN
District 4

THE QUEST FOR CLEAN BEETS - II

By AUSTIN ARMER
Agricultural Engineer, Spreckels Sugar Company

EDITOR'S NOTE — This is the second of a series of articles dealing with the many factors contributing to the delivery of sugar beets ready for processing *to the sugar factory.*

This is part 2 — the development of topping devices aimed at removing all the sugar beet foliage, but none of the root.

FROM 1938 to 1945, a comprehensive program of research and development in sugar beet field machinery was pursued at the University of California at Davis. The Department of Agricultural Engineering supplied shop, field and laboratory facilities in addition to a highly trained staff. The U.S. Department of Agriculture participated, and the project was financed through a grant from the U.S. Beet Sugar Association. The late Prof. H. B. Walker headed the project.

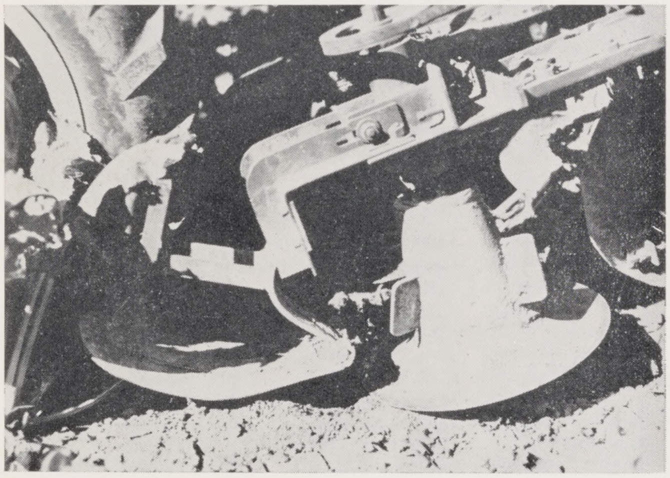
The development of a mechanical beet topper was a major item in this program — possibly because a "Beet Topper" was a field worker who chopped the tops from plow-loosened beets with a beet knife, knocked the roots together to shake off adhering soil, windrowed the roots, and later loaded the windrows into trucks. If a machine had been devised to perform all of these operations, it would have approached a complete harvester. But several mechanical toppers were developed by the project, and demonstrated a remarkable facility for accurately severing the foliage while the roots remained intact in the soil.

GROUND-TOPPING

Ground, or "In Place" topping has long appealed to harvester designers, mainly for these reasons:

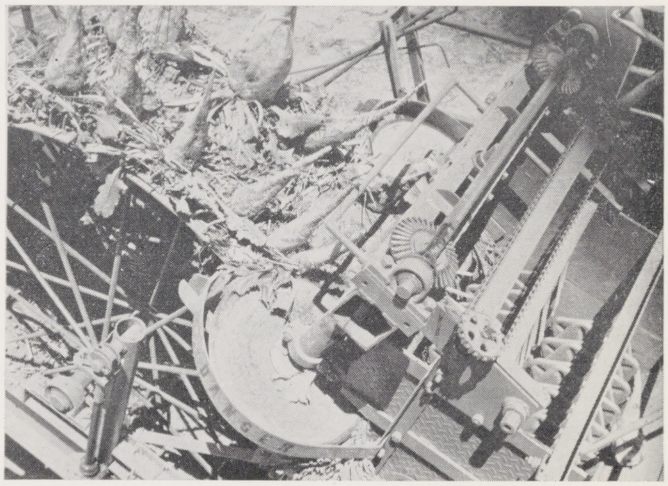
1.) The beets are rigidly fixed in the ground.
2.) The beets are *approximately* uniform in lat-

Continued on Page 32



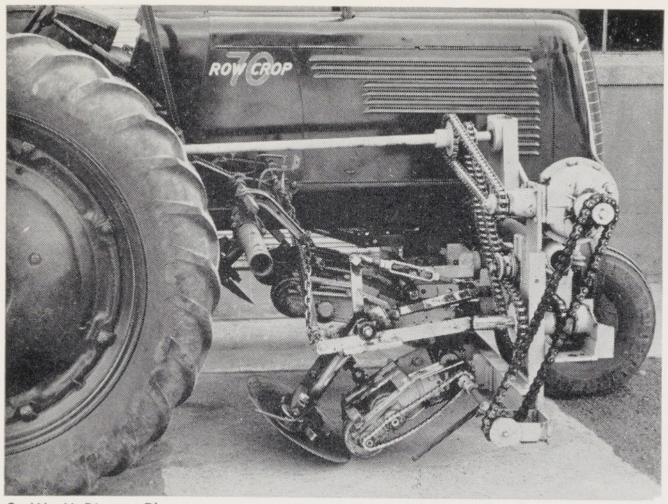
83

GROUND TOPPING was exemplified in 1945 by the "Bell Topper" of the Kiest harvester, ancestor of today's Gemco, Farmhand, John Deere, International and Imco harvesters.



84

MACHINE TOPPING by overlapping flat disk knives was used on this experimental 2-row Marbeet harvester in 1946.

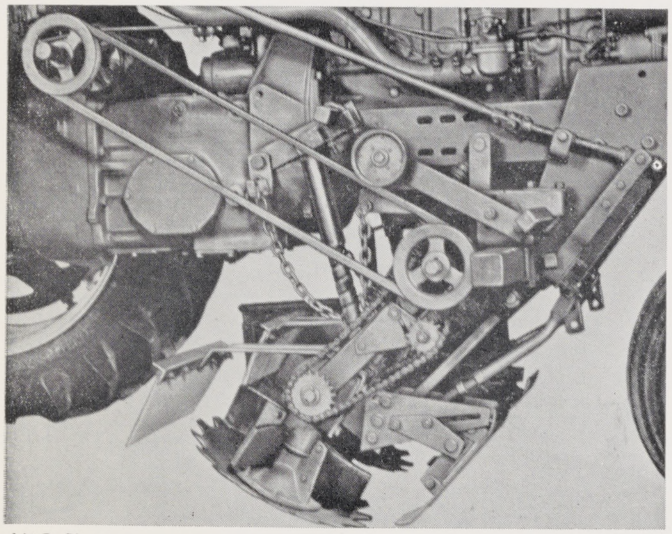


S. W. McBirney Photo 85

JOHN DEVEY and son Wayne built this disk topper in 1939. It performed well but at slow forward speed at Davis trials in 1939.

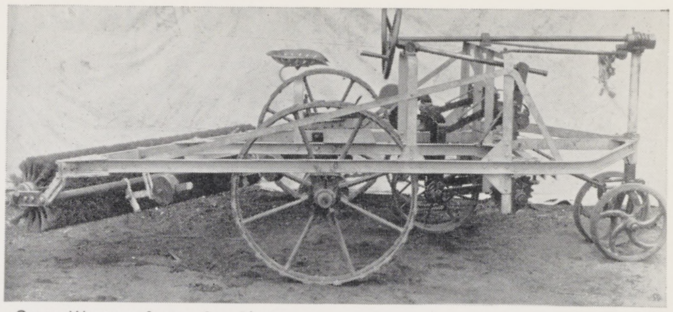
86

AUSTIN ARMER, Research Associate at Davis, redesigned the Devey topper for greater simplicity and forward speed in 1940.



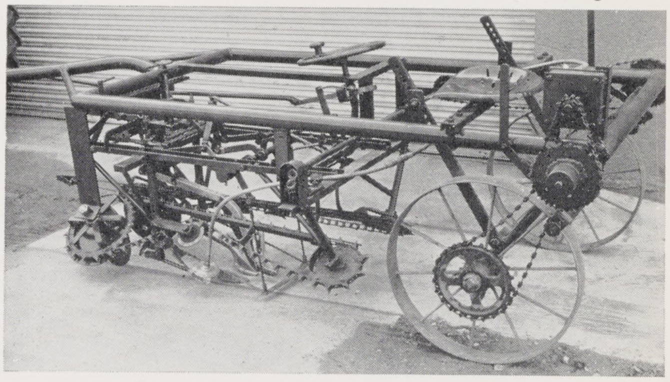
I.H.C. Photo 87

PRESENT INTERNATIONAL 21 topper (1963) is descendant of Devey and Armer experiments.



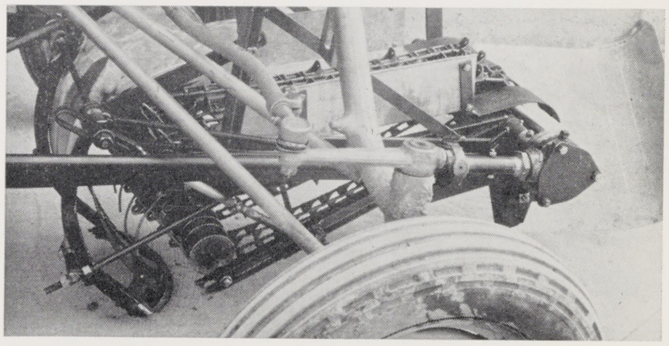
Great Western Sugar Co. Photo 88

PRUVOT TOPPER, built by Emile Degremont, Le Cateau, France in 1913 employed driven finder drum and fixed-ratio narrow cutting knife.



89

JOHN POWERS, U. of C. Agricultural Engineer at Davis designed this sophisticated variable-cut topper in 1938. It employed an inertia-drive vibrating knife, positioned by both vertical and lateral motion of finder and feelers.



90

AUSTIN ARMER, USDA Agricultural Engineer at Davis, designed this driven finder, crescent knife topper in 1943. Tops were conveyed upward and forward for eventual saving.

91

BEETS TOPPED by the Armer and Powers narrow knife toppers were almost perfectly crowned — but from 1939 to 1943, beets were far more uniform in size and spacing than they are in 1963.

CLEAN BEETS

Continued from Page 30

eral positioning.

3.) The beets, while not uniform in height at the crown, can be gaged by a "Finder" which adjusts the vertical position of cut.

4.) Topping and top saving may be a separate operation from root lifting and loading.

In 1913, the Great Western Sugar Company of Denver, Colorado, offered a substantial cash prize for a successful beet harvester. In response to this offer, over 50 machines were submitted, and 15 of these were fieldworthy enough for testing and appraisal. Eleven of the 15 used ground topping, and these 11 demonstrated about every combination of elements which has subsequently come into use. Following is a tabular outline of inventors, topping systems, and subsequent applications as of 1913.

Inventor, 1913	System	Subsequent Application
1. Arthur	Multiple disk roll finder narrow knife	Several contemporary English harvesters
2. Atwood	Roll Finder-fixed narrow knife	Lockwood Topper-Windrower (present)
3. Blevins & Lewis	Multiple finger finder fixed narrow knife	Armer experiments 1940-43
4. Crume	Multiple disk roll finder	See Item 1
5. Dawson	Flat Shoe finder, variable ratio Knife splits crown	Most contemporary U.S. disk toppers & scalpers Roscoe Zuckerman, 1943
6. Geibig	Flat shoe finder Rotary 8 blade cutter	See Item 5
7. Leyner	Multiple disk finder 2 flat cutting disks	Catchpole (England)
8. Murphy	Driven roll finder Oscillating knife	Devey, 1939, Armer (U.C.) 1940 Powers (U.C.), 1939
9. Pruvot, France	Driven roll finder Fixed narrow knife	Lockwood Topper-Windrower
10. Siedersleben, Germany	Multiple finger finder Concave topping disk	Armer (U.C.), 1941, Present Farmhand, John Deere, Gemco, International
11. Smith	Multiple disk finder Stationary narrow knife	Several Contemporary English harvesters

TOPPING IN THE MACHINE

While ground topping offers the self-evident advantages already mentioned, topping in the machine has certain unique virtues. These include:

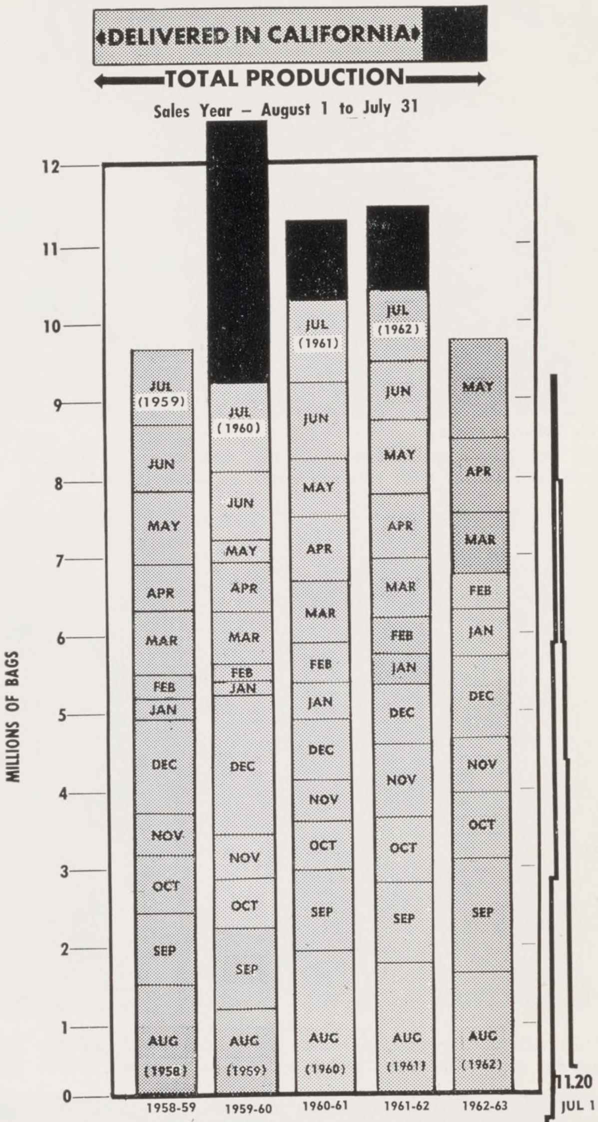
1.) All operations (digging, topping, loading) can be done in a single pass down the row.

2.) Higher speeds are possible than with ground toppers.

3.) Operation is possible in mud or peat, where beets are insecure in the soil.

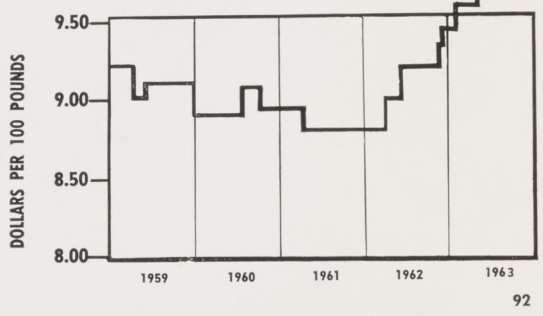
Some contemporary harvesters which top in the machine are Armer (Ireland), Marbeet and Scott-Urschel. Each of these makes use of a pair of counter-rotating disks, with slightly overlapping cutting edges.

PRODUCTION AND DELIVERIES OF BEET SUGAR IN CALIFORNIA



QUOTED PRICE OF BEET GRANULATED SUGAR

In 100 Lb. Paper Bags, F.O.B. San Francisco



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AUSTIN ARMER, EDITOR — SPRECKELS SUGAR COMPANY — WOODLAND, CALIFORNIA

SPC-DAVIS

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